
Newtown Creek Baseline Ecological Risk Assessment Benthic Macroinvertebrate Risk Assessment Summary

The following provides a summary of the process used in the Newtown Creek *Baseline Ecological Risk Assessment* (BERA) to evaluate risks to benthic macroinvertebrates. The process is summarized in two flow charts (see attached as Part 1 and Part 2), and described in the following sections.

Part 1

Overall Approach

The overall approach to the benthic (macroinvertebrate) risk assessment uses a sediment quality triad (SQT) consisting of chemistry, toxicity testing, and a benthic community evaluation. For the chemistry component of the SQT, the BERA uses bulk sediment chemistry, and to evaluate chemical bioavailability, bulk sediment acid volatile sulfide (AVS) and simultaneously extracted metals (SEM), and porewater chemistry. The use of AVS and SEM and porewater chemistry to evaluate bioavailability rather than rely on bulk sediment chemistry is consistent with the state-of-the-science to assess risks to benthic organisms. For the divalent metals copper, cadmium, lead, nickel, and zinc, bulk sediment AVS and SEM are often used to predict toxicity to benthic macroinvertebrates (Di Toro et al. 1992; Ankley et al. 1996; Berry et al. 1996; USEPA 2005). The AVS present in sediment reacts with these metals forming insoluble metal sulfides, thereby reducing bioavailability. While the use of bulk sediment chemistry is useful in the screening of chemicals for potential risk to benthic macroinvertebrates, it is well established in the scientific literature that sediment porewater is the primary route of exposure to benthic macroinvertebrates. Because of this, U.S. Environmental Protection Agency (USEPA) scientists have developed guidance that recognizes the limits of bulk sediment chemistry-based evaluations and recommends the use of porewater-based evaluations (USEPA 2003, 2005, 2012; Burgess 2009; Burgess et al. 2013). When measured porewater chemical concentrations are used in conjunction with sediment toxicity tests, the data provide a more definitive identification of contaminants contributing to benthic macroinvertebrate risk, and therefore, a more definitive dataset upon which to make remedial decisions. It is for these reasons that these techniques are used in the BERA.

In commenting on the benthic macroinvertebrate risk assessment, USEPA requested that the BERA discuss the relationship between porewater and bulk sediment chemistry to support the findings of the sediment toxicity tests, and that the discussion of confounding factors be confined to the uncertainty section of the BERA report rather than in the main body of the report. Therefore, the following discusses the chemistry and toxicity components of the

SQT, not the benthic community component, which appears to respond most strongly to dissolved oxygen concentrations in the water column.

Chemistry

Bulk sediment chemistry was first evaluated in the Screening Level Ecological Risk Assessment (**SLERA; Section 5 of the BERA report**), with a screening of all sediment chemicals (Remedial Investigation Phase 1 analytes) against sediment screening levels (SLs), using a hierarchy for selection of the SLs provided by USEPA. The results of the SLERA (see Table 5-7) identified bulk sediment contaminants of potential ecological concern (COPECs) consisting of the following:

- Thirteen metals: antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, tin, and zinc
- One conventional: cyanide
- Two volatile organic compounds (VOCs): isopropylbenzene and carbon disulfide
- Two semivolatile organic compounds (SVOCs): di-n-octyl phthalate and bis(2-ethylhexyl)phthalate (BEHP)
- Individual polycyclic aromatic hydrocarbons (PAHs), low-molecular-weight polycyclic aromatic hydrocarbons (LPAHs), high-molecular-weight polycyclic aromatic hydrocarbons (HPAHs), and total PAH (17) (TPAH [17])
- Nine pesticides: aldrin, dieldrin, endrin, chlordane, endosulfan sulfate, heptachlor epoxide, 4,4-DDD, 4,4-DDE, and 4,4-DDT
- Total polychlorinated biphenyl (TPCB) congeners

Most of these COPECs were evaluated further in the **baseline analyses for the benthic risk assessment (Section 8 of the BERA report)**. Cyanide was not evaluated further because of uncertainties with the SL (see Section 5.4.2), and the two VOCs were not evaluated further because, as discussed in the *Phase 2 Remedial Investigation Work Plan – Volume 1*, Phase 2 sediment samples were not analyzed for VOCs due to low or non-detects in Phase 1. Therefore, the two VOCs were not included in the sediment or porewater analyte list for the SQT samples.

To evaluate the bioavailability of the bulk sediment COPECs, the PAHs, TPCB, pesticides (including the 9 identified as COPECs), and metals (including the 13 identified as COPECs), were measured in porewater collected from test chambers run alongside the sediment toxicity test chambers. The two SVOC COPECs were not measured in porewater, but were addressed in Section 8.3.3.6 of the BERA report. As discussed, these higher molecular weight

phthalates are unlikely to be bioavailable, based on equilibrium partitioning theory, due to very low solubility. The baseline analyses also included measurement of bulk sediment AVS and SEM to evaluate the bioavailability of cadmium, copper, lead, zinc, and nickel.

Results of the baseline analyses show:

- Bulk sediment ΣSEM – AVS measurements were less than zero indicating a lack of bioavailability of copper, cadmium, lead, nickel, and zinc based on bulk sediment concentrations (see Figure E-1).
- Porewater COPECs with toxic units (TUs) greater than 1 were (see Table 8-4):
 - TPAH (34) and individual PAHs
 - Total SEM, copper, lead, and zinc
- All other sediment COPECs identified in the SLERA (see above) and measured in porewater were either non-detect or had porewater TUs less than 1

Toxicity

In the baseline analyses for the **benthic risk assessment (Section 8 of the BERA report)**, sediment bioassays were conducted to evaluate sediment toxicity. The bioassays were conducted using the amphipod, *Leptocheirus plumulosus*, and consisted of a 10-day acute test with survival as the endpoint, and a 28-day chronic test with survival, reproduction (per surviving amphipod and per surviving female), and growth (biomass and weight), as the endpoints.

The sediment toxicity tests were conducted for both the Study Area and each of the four Phase 2 reference areas. The results of the toxicity tests for the reference areas were used to develop a reference envelope, against which the results of the Study Area toxicity tests were compared (see Table 8-7 and Figures 8-13 to 8-18). The results of the toxicity tests and porewater chemistry were combined to develop porewater-based concentration-response relationships for those COPECs with porewater TUs greater than 1 (see Figures 8-19a through 8-24a). The metals and PAHs are evaluated as groups because it is assumed the toxicity is additive (USEPA 2003; USEPA 2005).

Part 2

The stations used to develop the porewater-based concentration-response relationships fell into the following two categories:

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- 1) **Stations for which the toxicity test results are consistent with expected porewater-based concentration-response relationships.** That is, the toxicity tests showed an adverse response (e.g., low survival), and porewater COPEC TUs were greater than 1.
 - 2) **Stations for which the toxicity test results are not consistent with expected porewater-based concentration-response relationships.** That is, for nine stations, the toxicity tests showed an adverse response (e.g., low survival), but porewater COPEC concentrations were low (resulting in TUs below 1 with a few between 1 and 2).

The nine stations are NC065, DK037, DK040, MC005, MC017, EB006, EB036, WE012, and WE014. Given the spatial location of these stations, factors associated with large combined sewer overflow (CSO) and municipal separate storm sewer system (MS4) discharges were a plausible explanation (e.g., see Figure 8-13). As presented in the BERA, because toxicity at these stations may be influenced by factors other than exposure to porewater COPECs, if these nine stations are not included, the porewater-based concentration-response relationships are improved (see Figures 8-19b through 8-24b).

To evaluate which of the toxicity tests (10-day versus 28-day) is a better predictor of toxicity for a complex site such as Newtown Creek, a contingency table analysis was conducted with and without the nine stations to assess uncertainty around predictions of toxicity. USEPA (2002) describes the use of contingency tables to evaluate multiple lines of evidence in sediment risk assessment, including evaluating outcomes expressed as true, a false negative, or a false positive. In the BERA, a false positive is defined as when endpoint performance is below the reference envelope and the TU is less than 1. A false negative is defined as when endpoint performance is within the reference envelope but the TU is greater than 1.

This analysis provided the following two important findings:

- 1) The false positive error rates improved (were lower) when the nine stations were removed, showing that these stations contribute to “errors” in the porewater concentration-response relationship.
- 2) For the 28-day test, the false positive error rates improved to less than 1% without the nine stations, but for the 10-day test, the false positive error rates improved but remained at 12%, reflecting that the 10-day results are a poor predictor of the porewater-based concentration-response relationships when compared to the 28-day test.

Based on these lines of evidence, the following are **concluded for the porewater concentration-response relationships:**

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- Porewater concentrations of sediment COPECs were used as primary line of evidence to interpret results of sediment bioassays.
 - Sediment bioassay results are best explained by porewater chemistry at most stations.
 - Sediment bioassay results explained by confounding factor analysis at nine stations located adjacent to large CSO and MS4 discharge locations.
 - No sediment bioassay stations were eliminated from consideration when interpreting the concentration-response relationships, but the interpretation of sediment bioassay results must consider confounding factors to understand the causes of toxicity.

References

- Ankley et al. (Ankley G.T., D.M. Di Toro, D.J. Hansen, and W. Berry), 1996. Technical basis and proposal for deriving sediment quality criteria for metals. *Environmental Toxicology and Chemistry* 15(12):2056–2066.
- Berry et al. (Berry, W.J., D.J. Hansen, J.D. Mahony, D. Robson, D.M. Di Toro, B. Shipley, B. Rogers, J. Corbin, and W. Boothman), 1996. Predicting the toxicity of metals-spiked laboratory sediments using acid volatile sulfide and interstitial water normalizations. *Environmental Toxicology and Chemistry* 15(12):2067–2079.
- Burgess et al. (Burgess, R.M., W.J. Berry, D. R. Mount, and D.M. DiToro), 2013. Mechanistic sediment quality guidelines based on contaminant bioavailability: equilibrium partitioning sediment benchmarks. *Environmental Toxicology and Chemistry* 32(1):102-114.
- Burgess, R.M., 2009. *Evaluating Ecological Risk to Invertebrate Receptors from PAHs in Sediments at Hazardous Waste Sites*. Prepared for U.S. Environmental Protection Agency, Ecological Risk Assessment Support Center. EPA/600/R-06/162.
- Di Toro et al. (Di Toro, D.M., J.D. Mahony, D.J. Hansen, K.J. Scott, A.R. Carlson, and G.T. Ankley), 1992. Acid Volatile Sulfide Predicts the Acute Toxicity of Cadmium and Nickel in Sediments. *Environmental Science and Technology* 26(1):96-101.
- USEPA (U.S. Environmental Protection Agency), 2002. *A Guidance Manual to Support the Assessment of Contaminated Sediments in Freshwater Ecosystems, Volume III - Interpretation of the Results of Sediment Quality Investigations*. Great Lakes National Program Office. USEPA-905-B02-001-C. December 2002.

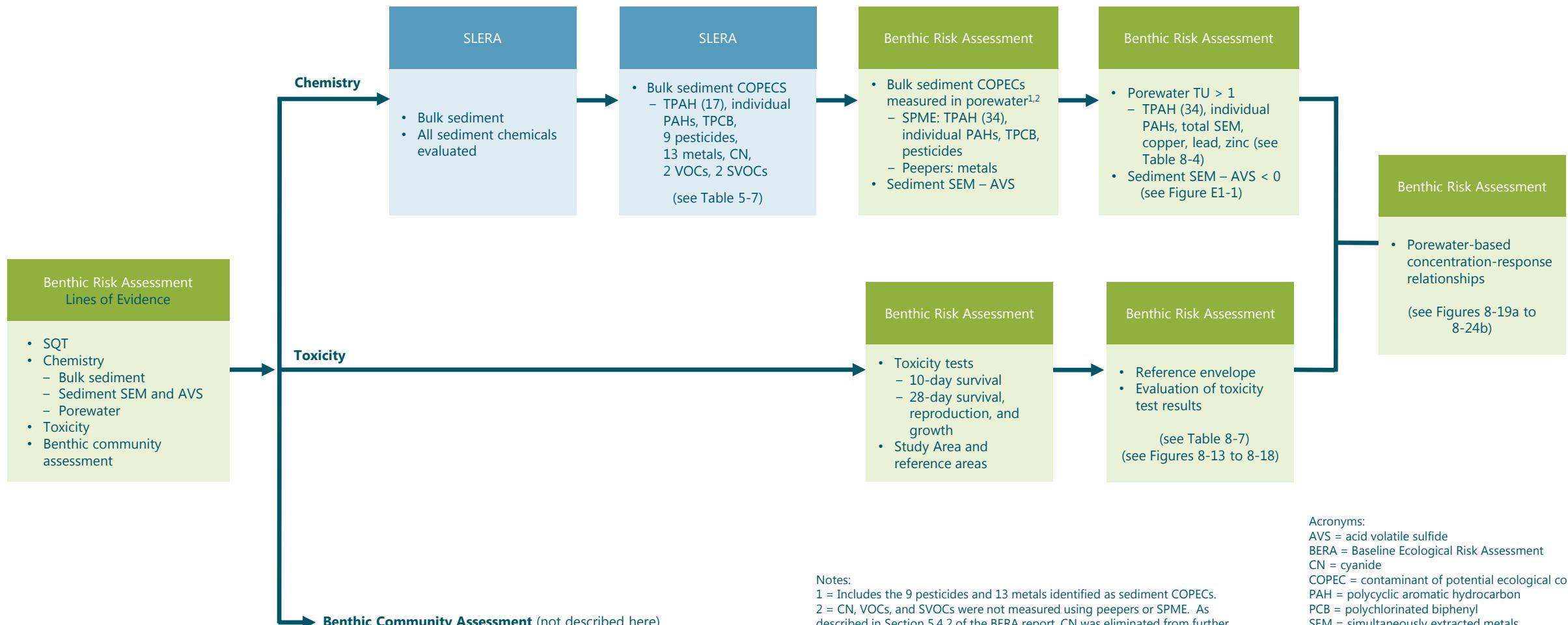
USEPA, 2003. *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures*. Office of Research and Development. USEPA 600-R-02-013. November 2003.

USEPA, 2005. *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metals Mixtures (Cadmium, Copper, Lead, Nickel, Silver and Zinc)*. Office of Research and Development. EPA 600/R-02/011. January 2005.

USEPA, 2012. *Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Procedures for the Determination of the Freely Dissolved Interstitial Water Concentrations of Nonionic Organics*. Office of Research and Development. EPA/600/R-02/012. December 2012.

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Benthic Macroinvertebrate Risk Assessment Process Flow Chart – Part 1



Notes:

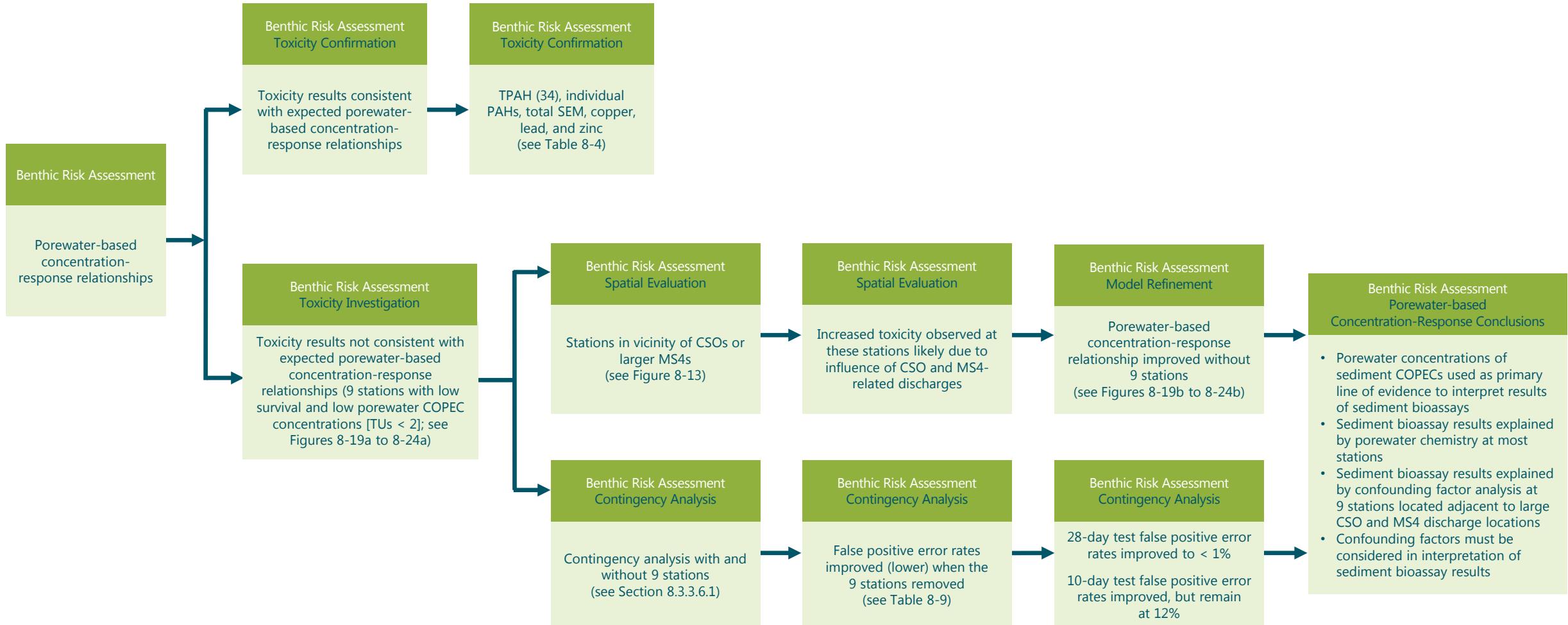
- 1 = Includes the 9 pesticides and 13 metals identified as sediment COPECs.
 2 = CN, VOCs, and SVOCs were not measured using peepers or SPME. As described in Section 5.4.2 of the BERA report, CN was eliminated from further evaluation because of uncertainty with the screening level, and the VOCs were eliminated from further evaluation because they were not measured in Phase 2 due to non-detected or low concentrations in Phase 1. The two SVOCs are addressed in the baseline in Section 8 of the BERA report.

Blue boxes capture the screening level risk analyses performed in Section 5 of the BERA report; the green boxes capture the baseline risk analyses performed for the benthic macroinvertebrates in Section 8 of the BERA report.

Acronyms:

- AVS = acid volatile sulfide
- BERA = Baseline Ecological Risk Assessment
- CN = cyanide
- COPEC = contaminant of potential ecological concern
- PAH = polycyclic aromatic hydrocarbon
- PCB = polychlorinated biphenyl
- SEM = simultaneously extracted metals
- SLERA = Screening Level Ecological Risk Assessment
- SQT = Sediment Quality Triad
- SPME = solid-phase microextraction
- SVOC = semivolatile organic compound
- TPAH = total polycyclic aromatic hydrocarbons
- TPCB = total polychlorinated biphenyls
- TU = toxic unit
- VOC = volatile organic compound

Benthic Macroinvertebrate Risk Assessment Process Flow Chart – Part 2



Acronyms:

- COPEC = contaminant of potential ecological concern
- CSO = combined sewer overflow
- MS4 = municipal separate storm sewer system
- PAH = polycyclic aromatic hydrocarbon
- SEM = simultaneously extracted metals
- TPAH = total polycyclic aromatic hydrocarbons
- TU = toxic unit

Table 5-7
Surface Sediment Screen

| Exposure Point | Chemical | CAS RN | Units | Frequency of Detection (%) | Maximum Detected Concentration ¹ | Maximum Non-detect Concentration ¹ | Maximum Concentration ¹ | Basis for Maximum (D/ND) | 95% UCL ¹ | UCL Type | Screening Level | Screening Level Note | COPEC Flag | Rationale for COPEC Flag |
|-----------------------------------|---|------------|-------------------|----------------------------|---|---|------------------------------------|--------------------------|----------------------|---|-----------------|----------------------|------------|--------------------------|
| Study Area | Conventional Parameters | | | | | | | | | | | | | |
| | Cyanide | 57-12-5 | mg/kg | 30 | 9.0 | 9.7 | 9.0 | D | 1.4 | 95% KM (% Bootstrap) UCL | 0.1 | -- | Yes | 95% UCL > SL |
| Metals | | | | | | | | | | | | | | |
| | Aluminum | 7429-90-5 | mg/kg | 100 | 24,000 | N/A | 24,000 | D | 12,000 | 95% Chebyshev (Mean, Sd) UCL | 18,000 | -- | No | 95% UCL < SL |
| | Antimony | 7440-36-0 | mg/kg | 100 | 110 | N/A | 110 | D | 7.1 | 95% Chebyshev (Mean, Sd) UCL | 2 | -- | Yes | 95% UCL > SL |
| | Arsenic | 7440-38-2 | mg/kg | 100 | 400 | N/A | 400 | D | 36 | 95% Chebyshev (Mean, Sd) UCL | 7.24 | -- | Yes | 95% UCL > SL |
| | Barium | 7440-39-3 | mg/kg | 100 | 680 | N/A | 680 | D | 170 | 95% Chebyshev (Mean, Sd) UCL | 20 | -- | Yes | 95% UCL > SL |
| | Beryllium | 7440-41-7 | mg/kg | 99 | 1.9 | 0.67 | 1.9 | D | 0.69 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Cadmium | 7440-43-9 | mg/kg | 100 | 250 | N/A | 250 | D | 25 | 95% Chebyshev (Mean, Sd) UCL | 0.68 | -- | Yes | 95% UCL > SL |
| | Chromium | 7440-47-3 | mg/kg | 100 | 1,400 | N/A | 1,400 | D | 210 | 95% Chebyshev (Mean, Sd) UCL | 52.3 | -- | Yes | 95% UCL > SL |
| | Cobalt | 7440-48-4 | mg/kg | 100 | 69 | N/A | 69 | D | 14 | 95% Chebyshev (Mean, Sd) UCL | 50 | -- | No | 95% UCL < SL |
| | Copper | 7440-50-8 | mg/kg | 100 | 37,000 | N/A | 37,000 | D | 1,800 | 95% Chebyshev (Mean, Sd) UCL | 18.7 | -- | Yes | 95% UCL > SL |
| | Lead | 7439-92-1 | mg/kg | 100 | 3,100 | N/A | 3,100 | D | 530 | 95% Chebyshev (Mean, Sd) UCL | 30.2 | -- | Yes | 95% UCL > SL |
| | Manganese | 7439-96-5 | mg/kg | 100 | 830 | N/A | 830 | D | 310 | 95% Chebyshev (Mean, Sd) UCL | 460 | -- | No | 95% UCL < SL |
| | Mercury | 7439-97-6 | mg/kg | 100 | 13 | N/A | 13 | D | 2.1 | 95% Chebyshev (Mean, Sd) UCL | 0.13 | -- | Yes | 95% UCL > SL |
| | Nickel | 7440-02-0 | mg/kg | 100 | 4,200 | N/A | 4,200 | D | 250 | 95% Chebyshev (Mean, Sd) UCL | 15.9 | -- | Yes | 95% UCL > SL |
| | Selenium | 7782-49-2 | mg/kg | 96 | 53 | 1.7 | 53 | D | 4.2 | 95% KM (BCA) UCL | 2 | -- | Yes | 95% UCL > SL |
| | Silver | 7440-22-4 | mg/kg | 100 | 52 | N/A | 52 | D | 9.9 | 95% Chebyshev (Mean, Sd) UCL | 0.73 | -- | Yes | 95% UCL > SL |
| | Thallium | 7440-28-0 | mg/kg | 99 | 2.5 | 0.44 | 2.5 | D | 0.37 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Tin | 7440-31-5 | mg/kg | 100 | 250 | N/A | 250 | D | 47 | 95% Chebyshev (Mean, Sd) UCL | 3.4 | -- | Yes | 95% UCL > SL |
| | Vanadium | 7440-62-2 | mg/kg | 100 | 150 | N/A | 150 | D | 51 | 95% Modified-t UCL | 57 | -- | No | 95% UCL < SL |
| | Zinc | 7440-66-6 | mg/kg | 100 | 14,000 | N/A | 14,000 | D | 1,700 | 95% Chebyshev(Mean, Sd) UCL (H-UCL recommended) | 124 | -- | Yes | 95% UCL > SL |
| Organometallic Compounds | | | | | | | | | | | | | | |
| | Methyl mercury | 22967-92-6 | µg/kg | 88 | 26 | 0.92 | 26 | D | 2.7 | 95% KM (Chebyshev) UCL | 100 | -- | No | Max Conc < SL |
| Volatile Organic Compounds | | | | | | | | | | | | | | |
| | 1,1,1-Trichloroethane | 71-55-6 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.856 | EqP | No | Max Conc < SL |
| | 1,1,2,2-Tetrachloroethane | 79-34-5 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.202 | EqP | No | Max Conc < SL |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | 76-13-1 | µg/kg | 0 | N/A | 14,000 | 14,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 1,1,2-Trichloroethane | 79-00-5 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.57 | EqP | No | Max Conc < SL |
| | 1,1-Dichloroethane | 75-34-3 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.00057 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 1,1-Dichloroethene | 75-35-4 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 2.78 | EqP | No | Max Conc < SL |
| | 1,2,3-Trichlorobenzene | 87-61-6 | µg/kg | 0.59 | 19 | 3,600 | 19 | D | N/A | N/A | 858 | -- | No | Max Conc < SL |
| | 1,2,4-Trichlorobenzene | 120-82-1 | mg/kg (at 1% TOC) | 2.4 | 0.033 | 0.18 | 0.033 | D | N/A | N/A | 0.473 | EqP | No | Max Conc < SL |
| | 1,2-Dibromo-3-chloropropane | 96-12-8 | µg/kg | 0 | N/A | 3,600 | 3,600 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 1,2-Dichlorobenzene | 95-50-1 | mg/kg (at 1% TOC) | 6 | 0.0084 | 0.18 | 0.0084 | D | 0.00078 | 95% KM (Percentile Bootstrap) UCL | 0.989 | EqP | No | Max Conc < SL |
| | 1,2-Dichloroethane | 107-06-2 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.26 | EqP | No | Max Conc < SL |

Table 5-7
Surface Sediment Screen

| Exposure Point | Chemical | CAS RN | Units | Frequency | Maximum Detected Concentration ¹ | Maximum Non-detect Concentration ¹ | Maximum Concentration ¹ | Basis for Maximum (D/ND) | 95% UCL ¹ | UCL Type | Screening Level | Screening Level Note | COPEC Flag | Rationale for COPEC Flag |
|----------------|---|---------------|-------------------|-----------|---|---|------------------------------------|--------------------------|----------------------|-----------------------------------|-----------------|----------------------|------------|--------------------------|
| Study Area | 1,2-Dichloroethene, cis- | 156-59-2 | µg/kg | 8.1 | 5.6 | 1,700 | 5.6 | D | 1.7 | 95% KM (Percentile Bootstrap) UCL | 1,050 | -- | No | Max Conc < SL |
| | 1,2-Dichloroethene, trans- | 156-60-5 | µg/kg | 0 | N/A | 1,700 | 1,700 | ND | N/A | N/A | 1,050 | -- | No | Max Conc < SL |
| | 1,2-Dichloropropane | 78-87-5 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.333 | EqP | No | Max Conc < SL |
| | 1,3-Dichlorobenzene | 541-73-1 | mg/kg (at 1% TOC) | 0 | N/A | 0.18 | 0.18 | ND | N/A | N/A | 0.842 | EqP | No | Max Conc < SL |
| | 1,3-Dichloropropene, cis- | 10061-01-5 | µg/kg | 0 | N/A | 1,700 | 1,700 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 1,3-Dichloropropene, trans- | 10061-02-6 | µg/kg | 0 | N/A | 1,700 | 1,700 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 1,4-Dichlorobenzene | 106-46-7 | mg/kg (at 1% TOC) | 25 | 0.076 | 0.18 | 0.076 | D | 0.0043 | 95% KM (BCA) UCL | 0.46 | EqP | No | Max Conc < SL |
| | 2-Butanone (MEK) | 78-93-3 | mg/kg (at 1% TOC) | 62 | 0.033 | 0.36 | 0.033 | D | 0.012 | 95% GROS Approximate Gamma UCL | 0.0424 | EqP | No | Max Conc < SL |
| | 2-Hexanone (Methyl butyl ketone) | 591-78-6 | mg/kg (at 1% TOC) | 0 | N/A | 0.36 | 0.36 | ND | N/A | N/A | 0.0582 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Acetone | 67-64-1 | mg/kg (at 1% TOC) | 62 | 0.15 | 1.3 | 0.15 | D | 0.051 | 95% KM (Percentile Bootstrap) UCL | 0.1997 | EqP | No | Max Conc < SL |
| | Benzene | 71-43-2 | mg/kg (at 1% TOC) | 25 | 0.46 | 0.16 | 0.46 | D | 0.063 | 97.5% KM (Chebyshev) UCL | 0.137 | EqP | No | 95% UCL < SL |
| | Bromochloromethane | 74-97-5 | µg/kg | 0 | N/A | 3,600 | 3,600 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Bromodichloromethane | 75-27-4 | µg/kg | 0 | N/A | 1,700 | 1,700 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Bromoform (Tribromomethane) | 75-25-2 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 1.31 | EqP | No | Max Conc < SL |
| | Bromomethane (Methyl bromide) | 74-83-9 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.00137 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Carbon disulfide | 75-15-0 | mg/kg (at 1% TOC) | 68 | 0.028 | 0.16 | 0.028 | D | 0.0090 | 95% GROS Approximate Gamma UCL | 0.00085 | EqP | Yes | 95% UCL > SL |
| | Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 7.24 | EqP | No | Max Conc < SL |
| | Chlorobenzene | 108-90-7 | mg/kg (at 1% TOC) | 14 | 0.0070 | 0.16 | 0.0070 | D | 0.0012 | 95% KM (Chebyshev) UCL | 0.162 | EqP | No | Max Conc < SL |
| | Chloroethane | 75-00-3 | µg/kg | 0 | N/A | 1,700 | 1,700 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Chloroform | 67-66-3 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 0.0954 | EqP | No | Max Conc < SL |
| | Chloromethane | 74-87-3 | µg/kg | 0 | N/A | 3,600 | 3,600 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Cyclohexane | 110-82-7 | µg/kg | 5 | 800 | 14,000 | 800 | D | 22 | 95% KM (Percentile Bootstrap) UCL | NA | -- | Uncertain | FoD < 5%_No SL |
| | Dibromochloromethane | 124-48-1 | µg/kg | 0 | N/A | 1,700 | 1,700 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Dichlorodifluoromethane | 75-71-8 | µg/kg | 0 | N/A | 7,200 | 7,200 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Dichloromethane (Methylene chloride) | 75-09-2 | mg/kg (at 1% TOC) | 6 | 0.0019 | 0.36 | 0.0019 | D | 0.0017 | 95% KM (Percentile Bootstrap) UCL | 0.159 | EqP | No | Max Conc < SL |
| | Ethylbenzene | 100-41-4 | mg/kg (at 1% TOC) | 30 | 1.1 | 0.13 | 1.1 | D | 0.11 | 95% Approximate Gamma KM-UCL | 0.305 | EqP | No | 95% UCL < SL |
| | Ethylene dibromide (1,2-Dibromoethane) | 106-93-4 | µg/kg | 0 | N/A | 2,900 | 2,900 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Isopropylbenzene (Cumene) | 98-82-8 | µg/kg | 23 | 820 | 1,700 | 820 | D | 97 | 97.5% KM (Chebyshev) UCL | 86 | -- | Yes | 95% UCL > SL |
| | Methyl acetate | 79-20-9 | µg/kg | 0.58 | 20,000 | 12,000 | 20,000 | D | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Methyl isobutyl ketone (4-Methyl-2-pentanone or (MIBK)) | 108-10-1 | mg/kg (at 1% TOC) | 3.6 | 0.0015 | 0.4 | 0.0015 | D | N/A | N/A | 0.0251 | EqP | No | Max Conc < SL |
| | Methyl tert-butyl ether (MTBE) | 1634-04-4 | µg/kg | 4.1 | 65 | 1,700 | 65 | D | 4.0 | 95% KM (Percentile Bootstrap) UCL | NA | -- | Uncertain | FoD < 5%_No SL |
| | Methylcyclohexane | 108-87-2 | µg/kg | 11 | 3,500 | 2,900 | 3,500 | D | 130 | 95% Approximate Gamma KM-UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Styrene | 100-42-5 | mg/kg (at 1% TOC) | 0 | N/A | 0.16 | 0.16 | ND | N/A | N/A | 7.07 | EqP | No | Max Conc < SL |
| | Tetrachloroethene (PCE) | 127-18-4 | mg/kg (at 1% TOC) | 1.2 | 0.00017 | 0.16 | 0.00017 | D | N/A | N/A | 0.19 | EqP | No | Max Conc < SL |
| | Toluene | 108-88-3 | mg/kg (at 1% TOC) | 31 | 0.89 | 0.16 | 0.89 | D | 0.12 | 97.5% KM (Chebyshev) UCL | 1.09 | EqP | No | Max Conc < SL |
| | Total Xylene (KM) (RL) | tXylene_KM_RL | mg/kg (at 1% TOC) | 12 | 0.096 | 0.073 | 0.096 | D | 0.019 | 99% KM (Chebyshev) UCL | 0.046 | EqP | No | 95% UCL < SL |
| | Total xylene (reported, not calculated) | 1330-20-7 | µg/kg | 64 | 11,000 | 5,200 | 11,000 | D | 6,800 | 95% GROS Adjusted Gamma UCL | NA | -- | Uncertain | FoD > 5%_No SL |

Table 5-7
Surface Sediment Screen

| Exposure Point | Chemical | CAS RN | Units | Frequency | Maximum Detected Concentration ¹ | Maximum Non-detect Concentration ¹ | Maximum Concentration ¹ | Basis for Maximum (D/ND) | 95% UCL ¹ | UCL Type | Screening Level | Screening Level Note | COPEC Flag | Rationale for COPEC Flag |
|------------------------------|---|-----------|-------------------|-----------|---|---|------------------------------------|--------------------------|----------------------|-----------------------------------|-----------------|----------------------|------------|--------------------------|
| Study Area | Trichloroethene (TCE) | 79-01-6 | mg/kg (at 1% TOC) | 2.4 | 0.00046 | 0.16 | 0.00046 | D | N/A | N/A | 8.95 | EqP | No | Max Conc < SL |
| | Trichlorofluoromethane (Fluorotrichloromethane) | 75-69-4 | µg/kg | 0 | N/A | 3,600 | 3,600 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Vinyl acetate | 108-05-4 | mg/kg (at 1% TOC) | 0 | N/A | 0.36 | 0.36 | ND | N/A | N/A | 0.013 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Vinyl chloride | 75-01-4 | mg/kg (at 1% TOC) | 3.6 | 0.00029 | 0.16 | 0.00029 | D | N/A | N/A | 0.43067 | EqP | No | Max Conc < SL |
| Semivolatile Organics | | | | | | | | | | | | | | |
| | 1,2,4,5-Tetrachlorobenzene | 95-94-3 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 47 | EqP | No | Max Conc < SL |
| | 1,4-Dioxane | 123-91-1 | mg/kg (at 1% TOC) | 0 | N/A | 14 | 14 | ND | N/A | N/A | 0.587 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 2,3,4,6-Tetrachlorophenol | 58-90-2 | µg/kg | 0 | N/A | 85,000 | 85,000 | ND | N/A | N/A | 284 | -- | Uncertain | FoD < 5%_RL > SL |
| | 2,4,5-Trichlorophenol | 95-95-4 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 0.819 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 2,4,6-Trichlorophenol | 88-06-2 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 2.65 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 2,4-Dichlorophenol | 120-83-2 | µg/kg | 0 | N/A | 17,000 | 17,000 | ND | N/A | N/A | 117 | -- | Uncertain | FoD < 5%_RL > SL |
| | 2,4-Dimethylphenol | 105-67-9 | µg/kg | 0.86 | 1,200 | 85,000 | 1,200 | D | N/A | N/A | 29 | -- | Uncertain | FoD < 5%_RL > SL |
| | 2,4-Dinitrophenol | 51-28-5 | mg/kg (at 1% TOC) | 0 | N/A | 37 | 37 | ND | N/A | N/A | 0.00621 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 2,4-Dinitrotoluene | 121-14-2 | µg/kg | 0 | N/A | 85,000 | 85,000 | ND | N/A | N/A | 41.6 | -- | Uncertain | FoD < 5%_RL > SL |
| | 2,6-Dinitrotoluene | 606-20-2 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 0.15503 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 2-Chloronaphthalene | 91-58-7 | mg/kg (at 1% TOC) | 0 | N/A | 1.4 | 1.4 | ND | N/A | N/A | 0.417 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 2-Chlorophenol | 95-57-8 | mg/kg (at 1% TOC) | 0.36 | 0.0058 | 7.2 | 0.0058 | D | N/A | N/A | 0.344 | EqP | No | Max Conc < SL |
| | 2-Methylphenol (o-Cresol) | 95-48-7 | µg/kg | 0.55 | 54 | 85,000 | 54 | D | N/A | N/A | 8 | -- | Uncertain | FoD < 5%_RL > SL |
| | 2-Nitroaniline | 88-74-4 | µg/kg | 0 | N/A | 440,000 | 440,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 2-Nitrophenol | 88-75-5 | µg/kg | 0 | N/A | 85,000 | 85,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 3,3'-Dichlorobenzidine | 91-94-1 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 2.06 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 3-Methylphenol & 4-Methylphenol (m&p-Cresol) | MEPH3_4 | µg/kg | 64 | 40,000 | 7,200 | 40,000 | D | 1,400 | 95% KM (Chebyshev) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | 3-Nitroaniline | 99-09-2 | µg/kg | 0 | N/A | 440,000 | 440,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 4-Bromophenyl-phenyl ether | 101-55-3 | µg/kg | 0 | N/A | 85,000 | 85,000 | ND | N/A | N/A | 1,230 | -- | Uncertain | FoD < 5%_RL > SL |
| | 4-Chloro-3-methylphenol | 59-50-7 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 0.388 | EqP | Uncertain | FoD < 5%_RL > SL |
| | 4-Chloroaniline | 106-47-8 | mg/kg (at 1% TOC) | 18 | 0.080 | 7.2 | 0.080 | D | 0.026 | 95% KM (t) UCL | 0.146 | EqP | No | Max Conc < SL |
| | 4-Chlorophenyl phenyl ether | 7005-72-3 | µg/kg | 0 | N/A | 85,000 | 85,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 4-Nitroaniline | 100-01-6 | µg/kg | 0 | N/A | 440,000 | 440,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 4-Nitrophenol | 100-02-7 | mg/kg (at 1% TOC) | 0 | N/A | 37 | 37 | ND | N/A | N/A | 0.0133 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Acetophenone | 98-86-2 | µg/kg | 40 | 2,700 | 85,000 | 2,700 | D | 290 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Atrazine | 1912-24-9 | µg/kg | 0.27 | 110 | 85,000 | 110 | D | N/A | N/A | 6.62 | -- | Uncertain | FoD < 5%_RL > SL |
| | Benzaldehyde | 100-52-7 | µg/kg | 72 | 3,000 | 85,000 | 3,000 | D | 510 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Biphenyl (1,1'-Biphenyl) | 92-52-4 | µg/kg | 63 | 2,800 | 85,000 | 2,800 | D | 210 | 95% KM (BCA) UCL | 1,220 | -- | No | 95% UCL < SL |
| | Butylbenzyl phthalate | 85-68-7 | mg/kg (at 1% TOC) | 73 | 0.49 | 7.2 | 0.49 | D | 0.081 | 95% KM (Percentile Bootstrap) UCL | 16.8 | EqP | No | Max Conc < SL |
| | Caprolactam | 105-60-2 | µg/kg | 4.4 | 22,000 | 440,000 | 22,000 | D | 640 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD < 5%_No SL |
| | Di-n-butyl phthalate | 84-74-2 | mg/kg (at 1% TOC) | 68 | 0.81 | 7.2 | 0.81 | D | 0.050 | 95% KM (BCA) UCL | 1.16 | EqP | No | Max Conc < SL |
| | Di-n-octyl phthalate | 117-84-0 | µg/kg | 52 | 8,100 | 85,000 | 8,100 | D | 880 | 95% Approximate Gamma KM-UCL | 61 | -- | Yes | 95% UCL > SL |

Table 5-7
Surface Sediment Screen

| Exposure Point | Chemical | CAS RN | Units | Frequency | Maximum Detected Concentration ¹ | Maximum Non-detect Concentration ¹ | Maximum Concentration ¹ | Basis for Maximum (D/ND) | 95% UCL ¹ | UCL Type | Screening Level | Screening Level Note | COPEC Flag | Rationale for COPEC Flag |
|---|--|----------|-------------------|-----------|---|---|------------------------------------|--------------------------|----------------------|-----------------------------------|-----------------|----------------------|------------|--------------------------|
| Study Area | Dibenzofuran | 132-64-9 | mg/kg (at 1% TOC) | 60 | 0.49 | 7.2 | 0.49 | D | 0.047 | 95% KM (% Bootstrap) UCL | 7.3 | EqP | No | Max Conc < SL |
| | Diethyl phthalate | 84-66-2 | mg/kg (at 1% TOC) | 2.2 | 0.032 | 7.2 | 0.032 | D | 0.0079 | 95% KM (Percentile Bootstrap) UCL | 0.218 | EqP | No | Max Conc < SL |
| | Dimethyl phthalate | 131-11-3 | µg/kg | 5 | 460 | 85,000 | 460 | D | 120 | 95% KM (Percentile Bootstrap) UCL | 6 | -- | Uncertain | FoD < 5%_RL > SL |
| | Dinitro-o-cresol (4,6-Dinitro-2-methylphenol) | 534-52-1 | mg/kg (at 1% TOC) | 0 | N/A | 37 | 37 | ND | N/A | N/A | 0.104 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Hexachlorobutadiene (Hexachloro-1,3-butadiene) | 87-68-3 | mg/kg (at 1% TOC) | 0 | N/A | 1.4 | 1.4 | ND | N/A | N/A | 0.17 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Hexachlorocyclopentadiene | 77-47-4 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 0.139 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Hexachloroethane | 67-72-1 | mg/kg (at 1% TOC) | 0 | N/A | 7.2 | 7.2 | ND | N/A | N/A | 0.804 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Isophorone | 78-59-1 | mg/kg (at 1% TOC) | 0.72 | 0.86 | 7.2 | 0.86 | D | N/A | N/A | 0.432 | EqP | Uncertain | FoD < 5%_RL > SL |
| | Nitrobenzene | 98-95-3 | µg/kg | 0 | N/A | 170,000 | 170,000 | ND | N/A | N/A | 21 | -- | Uncertain | FoD < 5%_RL > SL |
| | Pentachlorophenol | 87-86-5 | mg/kg (at 1% TOC) | 0.76 | 0.22 | 7.2 | 0.22 | D | N/A | N/A | 7.97 | EqP | No | Max Conc < SL |
| | Phenol | 108-95-2 | µg/kg | 31 | 3,100 | 17,000 | 3,100 | D | 150 | 95% KM (BCA) UCL | 420 | -- | No | 95% UCL < SL |
| | bis(2-Chloroethoxy)methane | 111-91-1 | µg/kg | 0 | N/A | 85,000 | 85,000 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | bis(2-Chloroethyl)ether | 111-44-4 | mg/kg (at 1% TOC) | 0 | N/A | 1.4 | 1.4 | ND | N/A | N/A | 3.52 | EqP | No | Max Conc < SL |
| | bis(2-Ethylhexyl)phthalate | 117-81-7 | µg/kg | 100 | 510,000 | N/A | 510,000 | D | 55,000 | 95% Chebyshev (Mean, Sd) UCL | 182 | -- | Yes | 95% UCL > SL |
| | n-Nitrosodiphenylamine | 86-30-6 | mg/kg (at 1% TOC) | 0.72 | 0.020 | 7.2 | 0.020 | D | N/A | N/A | 422 | EqP | No | Max Conc < SL |
| Polycyclic Aromatic Hydrocarbons (PAHs) | | | | | | | | | | | | | | |
| 1-Methylnaphthalene | | | | | | | | | | | | | | |
| 1-Methylphenanthrene | | | | | | | | | | | | | | |
| 2,3,5-Trimethylnaphthalene (1,6,7-Trimethylnaphthalene) | | | | | | | | | | | | | | |
| 2,6-Dimethylnaphthalene | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | | | | | | | | | | | | | | |
| 4-Methylphenol (p-Cresol) | | | | | | | | | | | | | | |
| Acenaphthene | | | | | | | | | | | | | | |
| Acenaphthylene | | | | | | | | | | | | | | |
| Anthracene | | | | | | | | | | | | | | |
| Benzo(a)anthracene | | | | | | | | | | | | | | |
| Benzo(a)pyrene | | | | | | | | | | | | | | |
| Benzo(b)fluoranthene | | | | | | | | | | | | | | |
| Benzo(b,k)fluoranthene | | | | | | | | | | | | | | |
| Benzo(j,k)fluoranthene | | | | | | | | | | | | | | |
| Benzo(g,h,i)perylene | | | | | | | | | | | | | | |
| Chrysene | | | | | | | | | | | | | | |
| Dibenzo(a,h)anthracene | | | | | | | | | | | | | | |
| Dibenzo(a,h)anthracene and Dibenzo(a,c)anthracene | | | | | | | | | | | | | | |
| Fluoranthene | | | | | | | | | | | | | | |
| Fluorene | | | | | | | | | | | | | | |

Table 5-7
Surface Sediment Screen

| Exposure Point | Chemical | CAS RN | Units | Frequency | Maximum Detected Concentration ¹ | Maximum Non-detect Concentration ¹ | Maximum Concentration ¹ | Basis for Maximum (D/ND) | 95% UCL ¹ | UCL Type | Screening Level | Screening Level Note | COPEC Flag | Rationale for COPEC Flag |
|-------------------|---|------------------|-------------------|-----------|---|---|------------------------------------|--------------------------|----------------------|---|-----------------|----------------------|------------|--------------------------|
| Study Area | Indeno(1,2,3-c,d)pyrene | 193-39-5 | µg/kg | 98 | 26,000 | 17,000 | 26,000 | D | 3,400 | 95% KM (Chebyshev) UCL | 17 | -- | Yes | 95% UCL > SL |
| | Naphthalene | 91-20-3 | µg/kg | 97 | 110,000 | 11,000 | 110,000 | D | 4,400 | 95% KM (Chebyshev) UCL | 34.6 | -- | Yes | 95% UCL > SL |
| | Perylene | 198-55-0 | mg/kg (at 1% TOC) | 100 | 1.2 | N/A | 1.2 | D | 0.20 | 95% Chebyshev (Mean, Sd) UCL | 9.67 | EqP | No | Max Conc < SL |
| | Phenanthrene | 85-01-8 | µg/kg | 95 | 68,000 | 13,000 | 68,000 | D | 4,700 | 95% KM (BCA) UCL | 86.7 | -- | Yes | 95% UCL > SL |
| | Pyrene | 129-00-0 | µg/kg | 100 | 140,000 | N/A | 140,000 | D | 14,000 | 95% Chebyshev(Mean, Sd) UCL (H-UCL recommended) | 153 | -- | Yes | 95% UCL > SL |
| | Total HPAH (10 of 17) (KM) (RL) | tPAH_17_HM_KM_RL | µg/kg | 100 | 530,000 | 150,000 | 530,000 | D | 55,000 | 95% KM (BCA) UCL | 655 | -- | Yes | 95% UCL > SL |
| | Total LPAH (7 of 17) (KM) (RL) | tPAH_17_LM_KM_RL | µg/kg | 96 | 260,000 | 33,000 | 260,000 | D | 16,000 | 95% KM (BCA) UCL | 312 | -- | Yes | 95% UCL > SL |
| | Total PAH (17) (KM) (RL) | tPAH_17_KM_RL | µg/kg | 98 | 780,000 | 95,000 | 780,000 | D | 71,000 | 95% KM (BCA) UCL | 2,900 | -- | Yes | 95% UCL > SL |
| Pesticides | | | | | | | | | | | | | | |
| | 2,4'-DDD (o,p'-DDD) | 53-19-0 | µg/kg | 82 | 430 | 120 | 430 | D | 40 | 95% KM (Chebyshev) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | 2,4'-DDE (o,p'-DDE) | 3424-82-6 | µg/kg | 86 | 140 | 140 | 140 | D | 8.4 | 95% KM (Chebyshev) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | 2,4'-DDT (o,p'-DDT) | 789-02-6 | µg/kg | 17 | 1,700 | 140 | 1,700 | D | 37 | 97.5% KM (Chebyshev) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | 4,4'-DDD (p,p'-DDD) | 72-54-8 | µg/kg | 92 | 1,000 | 140 | 1,000 | D | 84 | 95% KM (Chebyshev) UCL | 1.22 | -- | Yes | 95% UCL > SL |
| | 4,4'-DDE (p,p'-DDE) | 72-55-9 | µg/kg | 96 | 480 | 140 | 480 | D | 67 | 95% KM (Chebyshev) UCL | 2.07 | -- | Yes | 95% UCL > SL |
| | 4,4'-DDT (p,p'-DDT) | 50-29-3 | µg/kg | 66 | 390 | 150 | 390 | D | 26 | 95% KM (Chebyshev) UCL | 1.19 | -- | Yes | 95% UCL > SL |
| | Aldrin | 309-00-2 | µg/kg | 34 | 150 | 140 | 150 | D | 4.0 | 95% KM (Chebyshev) UCL | 2 | -- | Yes | 95% UCL > SL |
| | Chlordane, alpha- (Chlordane, cis-) | 5103-71-9 | mg/kg (at 1% TOC) | 86 | 0.034 | 0.017 | 0.034 | D | 0.0069 | 95% KM (Chebyshev) UCL | 0.0042 | EqP | Yes | 95% UCL > SL |
| | Chlordane, beta- (Chlordane, trans-) | 5103-74-2 | mg/kg (at 1% TOC) | 84 | 0.049 | 0.011 | 0.049 | D | 0.0092 | 95% GROS Approximate Gamma UCL | 0.0042 | EqP | Yes | 95% UCL > SL |
| | Dieldrin | 60-57-1 | µg/kg | 82 | 280 | 140 | 280 | D | 26 | 95% KM (Chebyshev) UCL | 0.72 | -- | Yes | 95% UCL > SL |
| | Endosulfan sulfate | 1031-07-8 | mg/kg (at 1% TOC) | 12 | 0.00050 | 0.017 | 0.00050 | D | 0.00050 | Maximum (recommended UCL > Max) | 0.00036 | EqP | Yes | 95% UCL > SL |
| | Endosulfan, alpha- (I) | 959-98-8 | µg/kg | 7.2 | 25 | 140 | 25 | D | 1.1 | 95% KM (Percentile Bootstrap) UCL | 2.9 | -- | No | 95% UCL < SL |
| | Endosulfan, beta (II) | 33213-65-9 | µg/kg | 16 | 11 | 140 | 11 | D | 0.66 | 95% KM (BCA) UCL | 14 | -- | No | Max Conc < SL |
| | Endrin | 72-20-8 | µg/kg | 25 | 350 | 140 | 350 | D | 10 | 95% KM (Chebyshev) UCL | 2.67 | -- | Yes | 95% UCL > SL |
| | Endrin aldehyde | 7421-93-4 | mg/kg (at 1% TOC) | 9.4 | 0.00093 | 0.017 | 0.00093 | D | 0.0009 | Maximum (recommended UCL > Max) | 0.48 | EqP | No | Max Conc < SL |
| | Endrin ketone | 53494-70-5 | µg/kg | 18 | 140 | 130 | 140 | D | 2.2 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Heptachlor | 76-44-8 | µg/kg | 22 | 120 | 140 | 120 | D | 2.6 | 95% KM (Chebyshev) UCL | 68 | -- | No | 95% UCL < SL |
| | Heptachlor epoxide | 1024-57-3 | µg/kg | 72 | 130 | 140 | 130 | D | 5.6 | 95% KM (Chebyshev) UCL | 0.6 | -- | Yes | 95% UCL > SL |
| | Hexachlorobenzene | 118-74-1 | µg/kg | 63 | 150 | 17,000 | 150 | D | 10 | 95% KM (Chebyshev) UCL | 20 | -- | No | 95% UCL < SL |
| | Hexachlorocyclohexane (BHC), alpha- | 319-84-6 | mg/kg (at 1% TOC) | 40 | 0.0063 | 0.017 | 0.0063 | D | 0.0001 | 95% KM (% Bootstrap) UCL | 1.36 | EqP | No | Max Conc < SL |
| | Hexachlorocyclohexane (BHC), beta- | 319-85-7 | µg/kg | 35 | 57 | 140 | 57 | D | 0.69 | 95% KM (% Bootstrap) UCL | 5 | -- | No | 95% UCL < SL |
| | Hexachlorocyclohexane (BHC), delta- | 319-86-8 | µg/kg | 24 | 160 | 140 | 160 | D | 5.1 | 95% KM (Chebyshev) UCL | 6,400 | -- | No | Max Conc < SL |
| | Hexachlorocyclohexane (BHC), gamma- (Lindane) | 58-89-9 | µg/kg | 13 | 3.0 | 140 | 3.0 | D | 0.16 | 95% KM (t) UCL | 0.32 | -- | No | 95% UCL < SL |

Table 5-7
Surface Sediment Screen

| Exposure Point | Chemical | CAS RN | Units | Frequency | Maximum Detected Concentration ¹ | Maximum Non-detect Concentration ¹ | Maximum Concentration ¹ | Basis for Maximum (D/ND) | 95% UCL ¹ | UCL Type | Screening Level | Screening Level Note | COPEC Flag | Rationale for COPEC Flag |
|---|---|----------------|-------------------|-----------|---|---|------------------------------------|--------------------------|----------------------|-----------------------------------|-----------------|----------------------|------------|--------------------------|
| Study Area | Methoxychlor | 72-43-5 | mg/kg (at 1% TOC) | 41 | 0.013 | 0.033 | 0.013 | D | 0.0075 | 95% GROS Approximate Gamma UCL | 0.0296 | EqP | No | Max Conc < SL |
| | Mirex | 2385-85-5 | µg/kg | 56 | 21 | 140 | 21 | D | 0.95 | 95% KM (% Bootstrap) UCL | 7 | -- | No | 95% UCL < SL |
| | Nonachlor, cis- | 5103-73-1 | µg/kg | 82 | 110 | 140 | 110 | D | 14 | 95% KM (Chebyshev) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Nonachlor, trans- | 39765-80-5 | µg/kg | 91 | 260 | 5,500 | 260 | D | 44 | 97.5% KM (Chebyshev) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Oxychlordane | 27304-13-8 | µg/kg | 31 | 44 | 140 | 44 | D | 0.72 | 95% KM (BCA) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Toxaphene | 8001-35-2 | mg/kg (at 1% TOC) | 0 | N/A | 0.67 | 0.67 | ND | N/A | N/A | 0.536 | EqP | No | Max Conc < SL |
| Herbicides | | | | | | | | | | | | | | |
| | 2,2-Dichloropropionic acid (Dalapon) | 75-99-0 | µg/kg | 0 | N/A | 620 | 620 | ND | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | 2,4,5-T (2,4,5-Trichlorophenoxyacetic acid) | 93-76-5 | µg/kg | 4.3 | 23 | 140 | 23 | D | 19 | 95% KM (Percentile Bootstrap) UCL | 12,300 | -- | No | Max Conc < SL |
| | 2,4,5-TP (Silvex) | 93-72-1 | µg/kg | 2.5 | 26 | 140 | 26 | D | 20 | 95% KM (t) UCL | 675 | -- | No | Max Conc < SL |
| | 2,4-D (2,4-Dichlorophenoxyacetic acid) | 94-75-7 | mg/kg (at 1% TOC) | 6.8 | 0.011 | 0.076 | 0.011 | D | 0.0091 | 95% KM (Percentile Bootstrap) UCL | 1.273 | EqP | No | Max Conc < SL |
| | 2,4-DB (2,4-D derivative) | 94-82-6 | µg/kg | 1.2 | 120 | 550 | 120 | D | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Dicamba | 1918-00-9 | mg/kg (at 1% TOC) | 2.7 | 0.0057 | 0.045 | 0.0057 | D | N/A | N/A | 0.313 | EqP | No | Max Conc < SL |
| | Dichlorprop | 120-36-5 | µg/kg | 24 | 440 | 550 | 440 | D | 100 | 95% KM (t) UCL | NA | -- | Uncertain | FoD > 5%_No SL |
| | Dinoseb | 88-85-7 | µg/kg | 0.63 | 37 | 83 | 37 | D | N/A | N/A | 0.611 | -- | Uncertain | FoD < 5%_RL > SL |
| | Mecoprop (MCPP) | 93-65-2 | µg/kg | 0.62 | 28,000 | 55,000 | 28,000 | D | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| | Mephanac (MCPPA) | 94-74-6 | µg/kg | 1.2 | 9,300 | 55,000 | 9,300 | D | N/A | N/A | NA | -- | Uncertain | FoD < 5%_No SL |
| Polychlorinated Biphenyl (PCB) Congeners | | | | | | | | | | | | | | |
| | Total PCB Congener (KM) (RL) | tPCBCong_KM_RL | ng/kg | 100 | 3.8E+08 | N/A | 3.8E+08 | D | 1E+07 | 95% Chebyshev (Mean, Sd) UCL | 40,000 | -- | Yes | 95% UCL > SL |

Notes:

1 = Values are rounded to two significant figures. Statistics (e.g., 95% UCLs) and hazard quotients were calculated prior to rounding.

95% UCL < SL = 95% UCL less than the screening level

95% UCL > SL = 95% UCL greater than the screening level

FoD < 5%_No SL = frequency of detection less than 5% and no screening level

FoD < 5%_RL > SL = frequency of detection less than 5% and reporting limit greater than screening level

FoD > 5%_No SL = frequency of detection greater than 5% and no screening level

Max Conc < SL = maximum concentration less than the screening level

Acronyms:

-- = none

µg/kg = microgram per kilogram

95% UCL = 95% upper confidence limit

BCA = bias-corrected accelerated

CAS RN = Chemical Abstracts Service Registry Number

COPEC = contaminant of potential ecological concern

D = detect

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

EqP = equilibrium partitioning

HPAH = high-molecular-weight polycyclic aromatic hydrocarbon

H-UCL = high upper confidence limit

KM = Kaplan-Meier

LPAH = low-molecular-weight polycyclic aromatic hydrocarbon

mg/kg = milligram per kilogram

mg/kg (at 1% TOC) = milligram per kilogram, normalized to 1% total organic carbon

N/A = not applicable

NA = not available

ND = non-detect

ng/kg = nanogram per kilogram

RL = reporting limit

Sd = standard deviation

(t) = Student's-t

TOC = total organic carbon

UCL = upper confidence limit

Table 8-4a
Study Area Porewater Toxic Unit Calculations

| Exposure Area | Matrix | Group | Chemical | CAS RN | Fraction | Unit | Count | Frequency of Detection | Minimum Concentration ¹ | Maximum Concentration ¹ | Detect Flag | Chronic Threshold Value | Minimum Toxic Unit ¹ | Maximum Toxic Unit ¹ |
|---------------|--------|------------------------------|---------------------|-----------|----------|------|-------|------------------------|------------------------------------|------------------------------------|-------------|-------------------------|---------------------------------|---------------------------------|
| Study Area | PEEP | METDISS | Antimony | 7440-36-0 | D | µg/L | 36 | 50 | 0.080 | 0.42 | D | 500 | 0.00016 | 0.00084 |
| | PEEP | METDISS | Arsenic | 7440-38-2 | D | µg/L | 36 | 53 | 0.29 | 4.9 | D | 36 | 0.0081 | 0.14 |
| | PEEP | METDISS | Barium | 7440-39-3 | D | µg/L | 36 | 100 | 15 | 280 | D | 404 | 0.037 | 0.69 |
| | PEEP | METDISS | Beryllium | 7440-41-7 | D | µg/L | 36 | 0 | 0.080 | 0.080 | ND | 0.66 | 0.12 | 0.12 |
| | PEEP | METDISS | Cadmium | 7440-43-9 | D | µg/L | 36 | 36 | 0.020 | 0.97 | D | 8.8 | 0.0023 | 0.11 |
| | PEEP | METDISS | Chromium | 7440-47-3 | D | µg/L | 36 | 81 | 1.6 | 11 | D | 57.5 | 0.028 | 0.19 |
| | PEEP | METDISS | Cobalt | 7440-48-4 | D | µg/L | 36 | 58 | 0.12 | 0.80 | D | 23 | 0.0052 | 0.035 |
| | PEEP | METDISS | Copper | 7440-50-8 | D | µg/L | 36 | 69 | 0.42 | 16 | D | 5.6 | 0.075 | 2.9 |
| | PEEP | METDISS | Lead | 7439-92-1 | D | µg/L | 36 | 97 | 0.12 | 9.4 | D | 8.1 | 0.015 | 1.2 |
| | PEEP | METDISS | Mercury | 7439-97-6 | D | µg/L | 36 | 0 | 0.10 | 0.10 | ND | 0.94 | 0.11 | 0.11 |
| | PEEP | METDISS | Nickel | 7440-02-0 | D | µg/L | 36 | 58 | 0.60 | 3.8 | D | 8.2 | 0.073 | 0.46 |
| | PEEP | METDISS | Selenium | 7782-49-2 | D | µg/L | 36 | 19 | 0.41 | 25 | D | 71 | 0.0058 | 0.36 |
| | PEEP | METDISS | Silver | 7440-22-4 | D | µg/L | 36 | 3 | 0.10 | 0.10 | D | 0.23 | 0.43 | 0.43 |
| | PEEP | METDISS | Thallium | 7440-28-0 | D | µg/L | 36 | 0 | 0.12 | 0.12 | ND | 21.3 | 0.0056 | 0.0056 |
| | PEEP | METDISS | Tin | 7440-31-5 | D | µg/L | 36 | 58 | 0.18 | 0.79 | D | 73 | 0.0025 | 0.011 |
| | PEEP | METDISS | Total SEM Metals TU | TSEM | D | µg/L | 36 | 100 | N/A | N/A | N/A | N/A | 0.15 | 7.2 |
| | PEEP | METDISS | Vanadium | 7440-62-2 | D | µg/L | 36 | 100 | 0.40 | 6.0 | D | 20 | 0.020 | 0.30 |
| | PEEP | METDISS | Zinc | 7440-66-6 | D | µg/L | 36 | 100 | 1.0 | 430 | D | 81 | 0.012 | 5.3 |
| SPME | ALKPAH | C1-Benzanthracenes/Chrysenes | C1_218-01-9 | D | µg/L | 35 | 26 | 0.026 | 2.8 | D | 0.8557 | 0.030 | 3.3 | |
| SPME | ALKPAH | C1-Fluoranthenes/Pyrenes | C1_FLRANPYRN | D | µg/L | 35 | 43 | 0.095 | 13 | D | 4.887 | 0.019 | 2.7 | |
| SPME | ALKPAH | C1-Fluorenes | C1_86-73-7 | D | µg/L | 35 | 63 | 0.15 | 9.6 | D | 13.99 | 0.011 | 0.69 | |
| SPME | ALKPAH | C1-Phenanthrenes/Anthracenes | C1_PHENANTH | D | µg/L | 35 | 57 | 0.10 | 25 | D | 7.436 | 0.013 | 3.4 | |
| SPME | ALKPAH | C2-Benzanthracenes/Chrysenes | C2_218-01-9 | D | µg/L | 35 | 9 | 0.89 | 4.0 | D | 0.4827 | 1.8 | 8.3 | |
| SPME | ALKPAH | C2-Fluorenes | C2_86-73-7 | D | µg/L | 35 | 46 | 0.31 | 23 | D | 5.305 | 0.057 | 4.2 | |
| SPME | ALKPAH | C2-Naphthalenes | C2_91-20-3 | D | µg/L | 35 | 77 | 0.50 | 25 | D | 30.24 | 0.017 | 0.81 | |
| SPME | ALKPAH | C2-Phenanthrenes/Anthracenes | C2_PHENANTH | D | µg/L | 35 | 54 | 0.46 | 68 | D | 3.199 | 0.14 | 21 | |
| SPME | ALKPAH | C3-Benzanthracenes/Chrysenes | C3_218-01-9 | D | µg/L | 35 | 3 | 4.4 | 4.4 | D | 0.1675 | 26 | 26 | |
| SPME | ALKPAH | C3-Fluorenes | C3_86-73-7 | D | µg/L | 35 | 29 | 1.6 | 30 | D | 1.916 | 0.84 | 16 | |
| SPME | ALKPAH | C3-Naphthalenes | C3_91-20-3 | D | µg/L | 35 | 77 | 0.20 | 140 | D | 11.1 | 0.018 | 13 | |
| SPME | ALKPAH | C3-Phenanthrenes/Anthracenes | C3_PHENANTH | D | µg/L | 35 | 43 | 0.26 | 47 | D | 1.256 | 0.21 | 37 | |
| SPME | ALKPAH | C4-Benzanthracenes/Chrysenes | C4_218-01-9 | D | µg/L | 35 | 0 | 0.010 | 0.010 | ND | 0.07062 | 0.14 | 0.14 | |
| SPME | ALKPAH | C4-Naphthalenes | C4_91-20-3 | D | µg/L | 35 | 66 | 0.40 | 150 | D | 4.048 | 0.099 | 36 | |
| SPME | ALKPAH | C4-Phenanthrenes/Anthracenes | C4_PHENANTH | D | µg/L | 35 | 31 | 0.57 | 73 | D | 0.5594 | 1.0 | 130 | |
| SPME | PAH | 1-Methylnaphthalene | 90-12-0 | D | µg/L | 35 | 63 | 0.050 | 4.1 | D | 81.69 | 0.00061 | 0.05 | |
| SPME | PAH | 2-Methylnaphthalene | 91-57-6 | D | µg/L | 35 | 51 | 0.060 | 2.0 | D | 81.69 | 0.00073 | 0.024 | |
| SPME | PAH | Acenaphthene | 83-32-9 | D | µg/L | 35 | 60 | 0.10 | 5.1 | D | 55.85 | 0.0018 | 0.091 | |
| SPME | PAH | Acenaphthylene | 208-96-8 | D | µg/L | 35 | 17 | 0.20 | 1.4 | D | 306.9 | 0.00065 | 0.0046 | |
| SPME | PAH | Anthracene | 120-12-7 | D | µg/L | 35 | 40 | 0.060 | 3.5 | D | 20.73 | 0.0029 | 0.17 | |
| SPME | PAH | Benzo(a)anthracene | 56-55-3 | D | µg/L | 35 | 57 | 0.0060 | 1.5 | D | 2.227 | 0.0027 | 0.65 | |
| SPME | PAH | Benzo(a)pyrene | 50-32-8 | D | µg/L | 35 | 14 | 0.030 | 0.50 | D | 0.9573 | 0.031 | 0.52 | |
| SPME | PAH | Benzo(b,k)fluoranthene | BKBFLANTH | D | µg/L | 35 | 14 | 0.18 | 0.84 | D | 0.6774 | 0.27 | 1.2 | |
| SPME | PAH | Benzo(e)pyrene | 192-97-2 | D | µg/L | 35 | 14 | 0.0090 | 0.45 | D | 0.9008 | 0.010 | 0.49 | |

Table 8-4a
Study Area Porewater Toxic Unit Calculations

| Exposure Area | Matrix | Group | Chemical | CAS RN | Fraction | Unit | Count | Frequency of Detection | Minimum Concentration ¹ | Maximum Concentration ¹ | Detect Flag | Chronic Threshold Value | Minimum Toxic Unit ¹ | Maximum Toxic Unit ¹ |
|---------------|--------|---------|---|-----------------|----------|------|-------|------------------------|------------------------------------|------------------------------------|-------------|-------------------------|---------------------------------|---------------------------------|
| Study Area | SPME | PAH | Benzo(g,h,i)perylene | 191-24-2 | D | µg/L | 35 | 11 | 0.016 | 0.39 | D | 0.4391 | 0.036 | 0.89 |
| | SPME | PAH | Chrysene | 218-01-9 | D | µg/L | 35 | 57 | 0.010 | 1.3 | D | 2.042 | 0.0049 | 0.61 |
| | SPME | PAH | Dibenzo(a,h)anthracene | 53-70-3 | D | µg/L | 35 | 9 | 0.018 | 0.096 | D | 0.2825 | 0.064 | 0.34 |
| | SPME | PAH | Fluoranthene | 206-44-0 | D | µg/L | 35 | 94 | 0.010 | 5.9 | D | 7.109 | 0.0014 | 0.82 |
| | SPME | PAH | Fluorene | 86-73-7 | D | µg/L | 35 | 63 | 0.045 | 1.4 | D | 39.3 | 0.0011 | 0.036 |
| | SPME | PAH | Indeno(1,2,3-c,d)pyrene | 193-39-5 | D | µg/L | 35 | 11 | 0.0070 | 0.16 | D | 0.275 | 0.025 | 0.58 |
| | SPME | PAH | Naphthalene | 91-20-3 | D | µg/L | 35 | 71 | 0.10 | 21 | D | 193.5 | 0.00052 | 0.11 |
| | SPME | PAH | Perylene | 198-55-0 | D | µg/L | 35 | 11 | 0.024 | 0.65 | D | 0.9008 | 0.027 | 0.72 |
| | SPME | PAH | Phenanthrene | 85-01-8 | D | µg/L | 35 | 51 | 0.10 | 2.6 | D | 19.13 | 0.0052 | 0.13 |
| | SPME | PAH | Pyrene | 129-00-0 | D | µg/L | 35 | 94 | 0.020 | 6.1 | D | 10.11 | 0.0020 | 0.60 |
| | SPME | PAH | Total PAH (34) TU | TPAH | D | µg/L | 35 | 100 | N/A | N/A | N/A | N/A | 0.46 | 270 |
| | SPME | PESTH | Aldrin | 309-00-2 | D | µg/L | 33 | 9 | 0.00000034 | 0.00000057 | D | 0.13 | 0.00000026 | 0.0000044 |
| | SPME | PESTH | Chlordane, alpha- (Chlordane, cis-) | 5103-71-9 | D | µg/L | 34 | 100 | 0.000046 | 0.0029 | D | 0.0064 | 0.0071 | 0.45 |
| | SPME | PESTH | Chlordane, beta- (Chlordane, trans-) | 5103-74-2 | D | µg/L | 34 | 100 | 0.000035 | 0.0031 | D | 0.0064 | 0.0054 | 0.48 |
| | SPME | PESTH | Dieldrin | 60-57-1 | D | µg/L | 34 | 100 | 0.00020 | 0.0085 | D | 0.11 | 0.0019 | 0.077 |
| | SPME | PESTH | Endosulfan sulfate | 1031-07-8 | D | µg/L | 34 | 0 | 0.000046 | 0.00056 | ND | 0.009 | 0.0051 | 0.063 |
| | SPME | PESTH | Endosulfan, alpha- (I) | 959-98-8 | D | µg/L | 34 | 21 | 0.00073 | 0.0084 | D | 0.0087 | 0.084 | 0.97 |
| | SPME | PESTH | Endosulfan, beta (II) | 33213-65-9 | D | µg/L | 34 | 0 | 0.00055 | 0.0068 | ND | 0.0087 | 0.063 | 0.78 |
| | SPME | PESTH | Endrin | 72-20-8 | D | µg/L | 34 | 0 | 0.0000090 | 0.000078 | ND | 0.01 | 0.00090 | 0.0078 |
| | SPME | PESTH | Heptachlor | 76-44-8 | D | µg/L | 34 | 0 | 0.0000020 | 0.000017 | ND | 0.0036 | 0.00056 | 0.0046 |
| | SPME | PESTH | Heptachlor epoxide | 1024-57-3 | D | µg/L | 34 | 88 | 0.000033 | 0.00056 | D | 0.0036 | 0.0093 | 0.16 |
| | SPME | PESTH | Hexachlorobenzene | 118-74-1 | D | µg/L | 34 | 100 | 0.0000050 | 0.00033 | D | 3.68 | 0.0000014 | 0.000091 |
| | SPME | PESTH | Hexachlorocyclohexane (BHC), alpha- | 319-84-6 | D | µg/L | 34 | 3 | 0.000043 | 0.000043 | D | 25 | 0.0000017 | 0.0000017 |
| | SPME | PESTH | Hexachlorocyclohexane (BHC), delta- | 319-86-8 | D | µg/L | 34 | 0 | 0.000015 | 0.000084 | ND | 141 | 0.00000010 | 0.00000060 |
| | SPME | PESTH | Hexachlorocyclohexane (BHC), gamma- (Lindane) | 58-89-9 | D | µg/L | 34 | 26 | 0.00014 | 0.00036 | D | 0.016 | 0.0086 | 0.023 |
| | SPME | PESTH | Methoxychlor | 72-43-5 | D | µg/L | 34 | 12 | 0.000074 | 0.0007 | D | 0.03 | 0.0025 | 0.023 |
| | SPME | PESTH | Mirex | 2385-85-5 | D | µg/L | 34 | 26 | 0.00000013 | 0.00000097 | D | 0.001 | 0.00013 | 0.00097 |
| | SPME | PESTH | Oxychlordane | 27304-13-8 | D | µg/L | 34 | 32 | 0.0000031 | 0.000021 | D | 0.0022 | 0.0014 | 0.0095 |
| | SPME | PESTH | Total DDx High Resolution (KM) (MDL) | tDDT_KM_MDL | D | µg/L | 34 | 100 | 0.00010 | 0.0017 | D | 0.007 | 0.014 | 0.24 |
| | SPME | PCBCONG | Total PCB Congener (KM) (MDL) | tPCBCong_KM_MDL | D | ng/L | 36 | 100 | 2.6 | 470 | D | 540 | 0.0049 | 0.87 |

Note:

1 = Values are rounded to two significant figures.

Acronyms:

µg/L = microgram per liter

ALKPAH = alkylated polycyclic aromatic hydrocarbon

CAS RN = Chemical Abstracts Service Registry Number

D = detect (Maximum Detect Flag column)

D = dissolved (Fraction column)

DDx = 2,4' and 4,4'-DDD, -DDE, -DDT

KM = Kaplan-Meier

MDL = method detection limit

METDISS = metals, dissolved

N/A = not applicable

ND = non-detect

ng/L = nanogram per liter

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

PCBCONG = PCB congener

PEEP = peeper

PESTH = pesticides – high resolution

SEM = simultaneously extracted metals

SPME = solid-phase microextraction

TU = toxic unit

Table 8-4b
Reference Area Porewater Toxic Unit Calculations

| Exposure Area | Matrix | Group | Chemical | CAS RN | Fraction | Unit | Count | Frequency of Detection | Minimum Concentration ¹ | Maximum Concentration ¹ | Detect Flag | Chronic Threshold Value | Minimum Toxic Unit ¹ | Maximum Toxic Unit ¹ |
|----------------|--------|---------|------------------------------|--------------|----------|------|-------|------------------------|------------------------------------|------------------------------------|-------------|-------------------------|---------------------------------|---------------------------------|
| Reference Area | PEEP | METDISS | Antimony | 7440-36-0 | D | µg/L | 24 | 21 | 0.084 | 0.28 | D | 500 | 0.00017 | 0.00056 |
| | PEEP | METDISS | Arsenic | 7440-38-2 | D | µg/L | 24 | 38 | 0.36 | 4.8 | D | 36 | 0.010 | 0.13 |
| | PEEP | METDISS | Barium | 7440-39-3 | D | µg/L | 24 | 100 | 12 | 230 | D | 404 | 0.030 | 0.57 |
| | PEEP | METDISS | Beryllium | 7440-41-7 | D | µg/L | 24 | 4 | 0.096 | 0.096 | D | 0.66 | 0.15 | 0.15 |
| | PEEP | METDISS | Cadmium | 7440-43-9 | D | µg/L | 24 | 4 | 0.036 | 0.036 | D | 8.8 | 0.0041 | 0.0041 |
| | PEEP | METDISS | Chromium | 7440-47-3 | D | µg/L | 24 | 88 | 1.3 | 7.3 | D | 57.5 | 0.022 | 0.13 |
| | PEEP | METDISS | Cobalt | 7440-48-4 | D | µg/L | 24 | 33 | 0.19 | 0.92 | D | 23 | 0.0083 | 0.04 |
| | PEEP | METDISS | Copper | 7440-50-8 | D | µg/L | 24 | 67 | 0.32 | 3.5 | D | 5.6 | 0.057 | 0.62 |
| | PEEP | METDISS | Lead | 7439-92-1 | D | µg/L | 24 | 83 | 0.10 | 6.8 | D | 8.1 | 0.012 | 0.84 |
| | PEEP | METDISS | Mercury | 7439-97-6 | D | µg/L | 24 | 0 | 0.10 | 0.10 | ND | 0.94 | 0.11 | 0.11 |
| | PEEP | METDISS | Nickel | 7440-02-0 | D | µg/L | 24 | 25 | 0.50 | 2.5 | D | 8.2 | 0.061 | 0.30 |
| | PEEP | METDISS | Selenium | 7782-49-2 | D | µg/L | 24 | 0 | 0.25 | 0.25 | ND | 71 | 0.0035 | 0.0035 |
| | PEEP | METDISS | Silver | 7440-22-4 | D | µg/L | 24 | 0 | 0.080 | 0.080 | ND | 0.23 | 0.35 | 0.35 |
| | PEEP | METDISS | Thallium | 7440-28-0 | D | µg/L | 24 | 0 | 0.12 | 0.12 | ND | 21.3 | 0.0056 | 0.0056 |
| | PEEP | METDISS | Tin | 7440-31-5 | D | µg/L | 24 | 54 | 0.18 | 0.60 | D | 73 | 0.0025 | 0.0082 |
| | PEEP | METDISS | Total SEM Metals TU | TSEM | D | µg/L | 24 | 100 | N/A | N/A | ND | N/A | 0.15 | 1.7 |
| | PEEP | METDISS | Vanadium | 7440-62-2 | D | µg/L | 24 | 100 | 0.92 | 5.8 | D | 20 | 0.046 | 0.29 |
| | PEEP | METDISS | Zinc | 7440-66-6 | D | µg/L | 24 | 100 | 1.0 | 10 | D | 81 | 0.012 | 0.12 |
| | SPME | ALKPAH | C1-Benzanthracenes/Chrysenes | C1_218-01-9 | D | µg/L | 24 | 0 | 0.0050 | 0.0050 | ND | 0.8557 | 0.0058 | 0.0058 |
| | SPME | ALKPAH | C1-Fluoranthenes/Pyrenes | C1_FLRANPYRN | D | µg/L | 24 | 0 | 0.010 | 0.010 | ND | 4.887 | 0.0020 | 0.0020 |
| | SPME | ALKPAH | C1-Fluorenes | C1_86-73-7 | D | µg/L | 24 | 8 | 0.15 | 0.2 | D | 13.99 | 0.011 | 0.014 |
| | SPME | ALKPAH | C1-Phenanthrenes/Anthracenes | C1_PHENANTH | D | µg/L | 24 | 4 | 0.10 | 0.10 | D | 7.436 | 0.013 | 0.013 |
| | SPME | ALKPAH | C2-Benzanthracenes/Chrysenes | C2_218-01-9 | D | µg/L | 24 | 0 | 0.010 | 0.010 | ND | 0.4827 | 0.021 | 0.021 |
| | SPME | ALKPAH | C2-Fluorenes | C2_86-73-7 | D | µg/L | 24 | 0 | 0.050 | 0.050 | ND | 5.305 | 0.0094 | 0.0094 |
| | SPME | ALKPAH | C2-Naphthalenes | C2_91-20-3 | D | µg/L | 24 | 21 | 0.40 | 1.6 | D | 30.24 | 0.013 | 0.051 |
| | SPME | ALKPAH | C2-Phenanthrenes/Anthracenes | C2_PHENANTH | D | µg/L | 24 | 0 | 0.050 | 0.050 | ND | 3.199 | 0.016 | 0.016 |
| | SPME | ALKPAH | C3-Benzanthracenes/Chrysenes | C3_218-01-9 | D | µg/L | 24 | 0 | 0.010 | 0.010 | ND | 0.1675 | 0.060 | 0.060 |
| | SPME | ALKPAH | C3-Fluorenes | C3_86-73-7 | D | µg/L | 24 | 0 | 0.060 | 0.060 | ND | 1.916 | 0.031 | 0.031 |
| | SPME | ALKPAH | C3-Naphthalenes | C3_91-20-3 | D | µg/L | 24 | 21 | 0.20 | 1.2 | D | 11.1 | 0.018 | 0.11 |
| | SPME | ALKPAH | C3-Phenanthrenes/Anthracenes | C3_PHENANTH | D | µg/L | 24 | 0 | 0.040 | 0.040 | ND | 1.256 | 0.032 | 0.032 |
| | SPME | ALKPAH | C4-Benzanthracenes/Chrysenes | C4_218-01-9 | D | µg/L | 24 | 0 | 0.010 | 0.010 | ND | 0.07062 | 0.14 | 0.14 |
| | SPME | ALKPAH | C4-Naphthalenes | C4_91-20-3 | D | µg/L | 24 | 13 | 0.31 | 0.63 | D | 4.048 | 0.075 | 0.15 |
| | SPME | ALKPAH | C4-Phenanthrenes/Anthracenes | C4_PHENANTH | D | µg/L | 24 | 0 | 0.020 | 0.020 | ND | 0.5594 | 0.036 | 0.036 |
| | SPME | PAH | 1-Methylnaphthalene | 90-12-0 | D | µg/L | 24 | 38 | 0.050 | 0.20 | D | 81.69 | 0.00061 | 0.0024 |
| | SPME | PAH | 2-Methylnaphthalene | 91-57-6 | D | µg/L | 24 | 46 | 0.050 | 0.20 | D | 81.69 | 0.00061 | 0.0024 |
| | SPME | PAH | Acenaphthene | 83-32-9 | D | µg/L | 24 | 13 | 0.10 | 0.20 | D | 55.85 | 0.0018 | 0.0036 |
| | SPME | PAH | Acenaphthylene | 208-96-8 | D | µg/L | 24 | 0 | 0.20 | 0.20 | ND | 306.9 | 0.00065 | 0.00065 |
| | SPME | PAH | Anthracene | 120-12-7 | D | µg/L | 24 | 0 | 0.050 | 0.050 | ND | 20.73 | 0.0024 | 0.0024 |
| | SPME | PAH | Benzo(a)anthracene | 56-55-3 | D | µg/L | 24 | 4 | 0.0040 | 0.0040 | D | 2.227 | 0.0018 | 0.0018 |
| | SPME | PAH | Benzo(a)pyrene | 50-32-8 | D | µg/L | 24 | 0 | 0.0080 | 0.0080 | ND | 0.9573 | 0.0084 | 0.0084 |
| | SPME | PAH | Benzo(b,k)fluoranthene | BKBFLANTH | D | µg/L | 24 | 0 | 0.0050 | 0.0050 | ND | 0.6774 | 0.0074 | 0.0074 |
| | SPME | PAH | Benzo(e)pyrene | 192-97-2 | D | µg/L | 24 | 0 | 0.0050 | 0.0050 | ND | 0.9008 | 0.0056 | 0.0056 |

Table 8-4b
Reference Area Porewater Toxic Unit Calculations

| Exposure Area | Matrix | Group | Chemical | CAS RN | Fraction | Unit | Count | Frequency of Detection | Minimum Concentration ¹ | Maximum Concentration ¹ | Detect Flag | Chronic Threshold Value | Minimum Toxic Unit ¹ | Maximum Toxic Unit ¹ |
|----------------|---------|-------------------------------|---|-------------|----------|------|-------|------------------------|------------------------------------|------------------------------------|-------------|-------------------------|---------------------------------|---------------------------------|
| Reference Area | SPME | PAH | Benzo(g,h,i)perylene | 191-24-2 | D | µg/L | 24 | 0 | 0.0010 | 0.0010 | ND | 0.4391 | 0.0023 | 0.0023 |
| | SPME | PAH | Chrysene | 218-01-9 | D | µg/L | 24 | 4 | 0.0070 | 0.0070 | D | 2.042 | 0.0034 | 0.0034 |
| | SPME | PAH | Dibenzo(a,h)anthracene | 53-70-3 | D | µg/L | 24 | 0 | 0.0020 | 0.0020 | ND | 0.2825 | 0.0071 | 0.0071 |
| | SPME | PAH | Fluoranthene | 206-44-0 | D | µg/L | 24 | 63 | 0.010 | 0.080 | D | 7.109 | 0.0014 | 0.011 |
| | SPME | PAH | Fluorene | 86-73-7 | D | µg/L | 24 | 8 | 0.040 | 0.20 | D | 39.3 | 0.0010 | 0.0051 |
| | SPME | PAH | Indeno(1,2,3-c,d)pyrene | 193-39-5 | D | µg/L | 24 | 0 | 0.0010 | 0.0010 | ND | 0.275 | 0.0036 | 0.0036 |
| | SPME | PAH | Naphthalene | 91-20-3 | D | µg/L | 24 | 58 | 0.10 | 0.80 | D | 193.5 | 0.00052 | 0.0041 |
| | SPME | PAH | Perylene | 198-55-0 | D | µg/L | 24 | 0 | 0.0040 | 0.0040 | ND | 0.9008 | 0.0044 | 0.0044 |
| | SPME | PAH | Phenanthrene | 85-01-8 | D | µg/L | 24 | 4 | 0.30 | 0.30 | D | 19.13 | 0.016 | 0.016 |
| | SPME | PAH | Pyrene | 129-00-0 | D | µg/L | 24 | 54 | 0.010 | 0.30 | D | 10.11 | 0.00099 | 0.03 |
| | SPME | PAH | Total PAH (34) TU | TPAH | D | µg/L | 24 | 100 | N/A | N/A | N/A | N/A | 0.46 | 0.77 |
| | SPME | PESTH | Aldrin | 309-00-2 | D | µg/L | 23 | 0 | 0.000000092 | 0.00000019 | ND | 0.13 | 0.00000071 | 0.000015 |
| | SPME | PESTH | Chlordane, alpha- (Chlordane, cis-) | 5103-71-9 | D | µg/L | 23 | 100 | 0.000020 | 0.00051 | D | 0.0064 | 0.0032 | 0.08 |
| | SPME | PESTH | Chlordane, beta- (Chlordane, trans-) | 5103-74-2 | D | µg/L | 23 | 100 | 0.000020 | 0.00036 | D | 0.0064 | 0.0032 | 0.056 |
| | SPME | PESTH | Dieldrin | 60-57-1 | D | µg/L | 23 | 100 | 0.000099 | 0.0019 | D | 0.11 | 0.00090 | 0.017 |
| | SPME | PESTH | Endosulfan sulfate | 1031-07-8 | D | µg/L | 23 | 0 | 0.000036 | 0.00035 | ND | 0.009 | 0.0040 | 0.038 |
| | SPME | PESTH | Endosulfan, alpha- (I) | 959-98-8 | D | µg/L | 23 | 13 | 0.00057 | 0.0016 | D | 0.0087 | 0.065 | 0.19 |
| | SPME | PESTH | Endosulfan, beta (II) | 33213-65-9 | D | µg/L | 23 | 0 | 0.00034 | 0.004 | ND | 0.0087 | 0.039 | 0.47 |
| | SPME | PESTH | Endrin | 72-20-8 | D | µg/L | 23 | 0 | 0.0000076 | 0.000049 | ND | 0.01 | 0.00076 | 0.0049 |
| | SPME | PESTH | Heptachlor | 76-44-8 | D | µg/L | 23 | 0 | 0.0000082 | 0.000015 | ND | 0.0036 | 0.00023 | 0.0041 |
| | SPME | PESTH | Heptachlor epoxide | 1024-57-3 | D | µg/L | 23 | 91 | 0.000017 | 0.00077 | D | 0.0036 | 0.0048 | 0.21 |
| | SPME | PESTH | Hexachlorobenzene | 118-74-1 | D | µg/L | 23 | 70 | 0.0000029 | 0.000072 | D | 3.68 | 0.00000079 | 0.000019 |
| | SPME | PESTH | Hexachlorocyclohexane (BHC), alpha- | 319-84-6 | D | µg/L | 23 | 9 | 0.000024 | 0.000035 | D | 25 | 0.00000096 | 0.0000014 |
| | SPME | PESTH | Hexachlorocyclohexane (BHC), delta- | 319-86-8 | D | µg/L | 23 | 0 | 0.0000075 | 0.000068 | ND | 141 | 0.000000053 | 0.00000048 |
| | SPME | PESTH | Hexachlorocyclohexane (BHC), gamma- (Lindane) | 58-89-9 | D | µg/L | 23 | 0 | 0.000015 | 0.00014 | ND | 0.016 | 0.00094 | 0.0087 |
| | SPME | PESTH | Methoxychlor | 72-43-5 | D | µg/L | 23 | 0 | 0.0000048 | 0.000085 | ND | 0.03 | 0.00016 | 0.0028 |
| | SPME | PESTH | Mirex | 2385-85-5 | D | µg/L | 23 | 22 | 0.00000081 | 0.00000019 | D | 0.001 | 0.000081 | 0.00019 |
| | SPME | PESTH | Oxychlordane | 27304-13-8 | D | µg/L | 23 | 17 | 0.0000027 | 0.0000087 | D | 0.0022 | 0.0012 | 0.004 |
| | SPME | PESTH | Total DDx High Resolution (KM) (MDL) | tDDT_KM_MDL | D | µg/L | 23 | 100 | 0.000034 | 0.00038 | D | 0.007 | 0.0048 | 0.054 |
| SPME | PCBCONG | Total PCB Congener (KM) (MDL) | tPCBCong_KM_MDL | D | ng/L | 24 | 100 | 0.37 | 2.3 | D | 540 | 0.00069 | 0.0042 | |

Note:

1 = Values are rounded to two significant figures.

Acronyms:

µg/L = microgram per liter

ALKPAH = alkylated polycyclic aromatic hydrocarbon

CAS RN = Chemical Abstracts Service Registry Number

D = detect (Maximum Detect Flag column)

D = dissolved (Fraction column)

DDx = 2,4' and 4,4'-DDD, -DDE, -DDT

KM = Kaplan-Meier

MDL = method detection limit

METDISS = metals, dissolved

N/A = not applicable

ND = non-detect

ng/L = nanogram per liter

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

PCBCONG = PCB congener

PEEP = peeper

PESTH = pesticides – high resolution

SEM = simultaneously extracted metals

SPME = solid-phase microextraction

TU = toxic unit

Table 8-4c
Porewater Chronic Threshold Values

| Group | Chemical | CAS RN | Selected Chronic Threshold Value (µg/L) | Reference |
|---------|--------------------------------------|--------------|---|---|
| ALKPAH | C1-Benzanthracenes/Chrysenes | C1_218-01-9 | 0.8557 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C1-Fluoranthenes/Pyrenes | C1_FLRANPYRN | 4.887 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C1-Fluorenes | C1_86-73-7 | 13.99 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C1-Phenanthrenes/Anthracenes | C1_PHENANTH | 7.436 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C2-Benzanthracenes/Chrysenes | C2_218-01-9 | 0.4827 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C2-Fluorenes | C2_86-73-7 | 5.305 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C2-Naphthalenes | C2_91-20-3 | 30.24 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C2-Phenanthrenes/Anthracenes | C2_PHENANTH | 3.199 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C3-Benzanthracenes/Chrysenes | C3_218-01-9 | 0.1675 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C3-Fluorenes | C3_86-73-7 | 1.916 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C3-Naphthalenes | C3_91-20-3 | 11.1 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C3-Phenanthrenes/Anthracenes | C3_PHENANTH | 1.256 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C4-Benzanthracenes/Chrysenes | C4_218-01-9 | 0.07062 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C4-Naphthalenes | C4_91-20-3 | 4.048 | USEPA 2003, EPA-600-R-02-013 |
| ALKPAH | C4-Phenanthrenes/Anthracenes | C4_PHENANTH | 0.5594 | USEPA 2003, EPA-600-R-02-013 |
| METDISS | Antimony | 7440-36-0 | 500 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| METDISS | Arsenic | 7440-38-2 | 36 | NYSDEC Saline Surface Waters (NYSDEC 1998) |
| METDISS | Barium | 7440-39-3 | 404 | USEPA, 1993. Water Quality Guidance for the Great Lakes System and Correction; Proposed Rules |
| METDISS | Beryllium | 7440-41-7 | 0.66 | USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b) |
| METDISS | Cadmium | 7440-43-9 | 8.8 | National Recommended Water Quality Criteria (USEPA 2015) |
| METDISS | Chromium | 7440-47-3 | 57.5 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| METDISS | Cobalt | 7440-48-4 | 23 | USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b) |
| METDISS | Copper | 7440-50-8 | 5.6 | NYSDEC Saline Surface Waters (NYSDEC 1998) |
| METDISS | Lead | 7439-92-1 | 8.1 | National Recommended Water Quality Criteria (USEPA 2015) |
| METDISS | Mercury | 7439-97-6 | 0.94 | National Recommended Water Quality Criteria (USEPA 2015) |
| METDISS | Nickel | 7440-02-0 | 8.2 | National Recommended Water Quality Criteria (USEPA 2015) |
| METDISS | Selenium | 7782-49-2 | 71 | National Recommended Water Quality Criteria (USEPA 2015) |
| METDISS | Silver | 7440-22-4 | 0.23 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| METDISS | Thallium | 7440-28-0 | 21.3 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| METDISS | Tin | 7440-31-5 | 73 | USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b) |
| METDISS | Vanadium | 7440-62-2 | 20 | USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b) |
| METDISS | Zinc | 7440-66-6 | 81 | National Recommended Water Quality Criteria (USEPA 2015) |
| PAH | 1-Methylnaphthalene | 90-12-0 | 81.69 | USEPA 2003, EPA-600-R-02-013 |
| PAH | 2-Methylnaphthalene | 91-57-6 | 81.69 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Acenaphthene | 83-32-9 | 55.85 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Acenaphthylene | 208-96-8 | 306.9 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Anthracene | 120-12-7 | 20.73 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Benzo(a)anthracene | 56-55-3 | 2.227 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Benzo(a)pyrene | 50-32-8 | 0.9573 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Benzo(b,k)fluoranthene | BKBFLANTH | 0.6774 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Benzo(e)pyrene | 192-97-2 | 0.9008 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Benzo(g,h,i)perylene | 191-24-2 | 0.4391 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Chrysene | 218-01-9 | 2.042 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Dibenz(a,h)anthracene | 53-70-3 | 0.2825 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Fluoranthene | 206-44-0 | 7.109 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Fluorene | 86-73-7 | 39.3 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Indeno(1,2,3-c,d)pyrene | 193-39-5 | 0.275 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Naphthalene | 91-20-3 | 193.5 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Perylene | 198-55-0 | 0.9008 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Phenanthrene | 85-01-8 | 19.13 | USEPA 2003, EPA-600-R-02-013 |
| PAH | Pyrene | 129-00-0 | 10.11 | USEPA 2003, EPA-600-R-02-013 |
| PESTH | Aldrin | 309-00-2 | 0.13 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| PESTH | Chlordane, alpha- (Chlordane, cis-) | 5103-71-9 | 0.0064 ^a | Ambient Water Quality Criteria for Chlordane (USEPA 1980) |
| PESTH | Chlordane, beta- (Chlordane, trans-) | 5103-74-2 | 0.0064 ^a | Ambient Water Quality Criteria for Chlordane (USEPA 1980) |
| PESTH | Dieldrin | 60-57-1 | 0.11 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |

Table 8-4c
Porewater Chronic Threshold Values

| Group | Chemical | CAS RN | Selected Chronic Threshold Value ($\mu\text{g/L}$) | Reference |
|---------|--|-----------------|--|--|
| PESTH | Endosulfan sulfate | 1031-07-8 | 0.009 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| PESTH | Endosulfan, alpha- (I) | 959-98-8 | 0.0087 | NYSDEC Saline Surface Waters (NYSDEC 1998) |
| PESTH | Endosulfan, beta (II) | 33213-65-9 | 0.0087 | NYSDEC Saline Surface Waters (NYSDEC 1998) |
| PESTH | Endrin | 72-20-8 | 0.01 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| PESTH | Heptachlor | 76-44-8 | 0.0036 | National Recommended Water Quality Criteria (USEPA 2015) |
| PESTH | Heptachlor epoxide | 1024-57-3 | 0.0036 | National Recommended Water Quality Criteria (USEPA 2015) |
| PESTH | Hexachlorobenzene | 118-74-1 | 3.68 ^a | Ambient Water Quality Criteria for Hexachlorobenzene (USEPA 1988) |
| PESTH | Hexachlorocyclohexane (BHC), alpha- | 319-84-6 | 25 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| PESTH | Hexachlorocyclohexane (BHC), delta- | 319-86-8 | 141 | USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b) |
| PESTH | Hexachlorocyclohexane (BHC), gamma- (Lindane) | 58-89-9 | 0.016 | USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a) |
| PESTH | Methoxychlor | 72-43-5 | 0.03 | National Recommended Water Quality Criteria (USEPA 2015) |
| PESTH | Mirex | 2385-85-5 | 0.001 | National Recommended Water Quality Criteria (USEPA 2015) |
| PESTH | Oxychlordane | 27304-13-8 | 0.0022 | USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b) |
| PESTH | Total DD _x High Resolution (KM) (MDL) | tDDT_KM_MDL | 0.007 | National Recommended Water Quality Criteria (USEPA 2015) |
| PCBCONG | Total PCB Congener (KM) (MDL) | tPCBCong_KM_MDL | 0.54 ^b | Fuchsman et al. 2006 |

Notes:

a = The chronic threshold values used for chlordane, alpha- (Chlordane, cis-), chlordane, beta- (Chlordane, trans-), and hexachlorobenzene were revised from the surface water risk screening to be protective of aquatic life; the values in the surface water risk screening were for the protection of wildlife.

b = The chronic threshold value used for total PCB congener (KM) (MDL) was revised from the surface water risk screening to be protective of benthic invertebrates; the value used in the surface water risk screening was for the protection of wildlife.

Acronyms:

$\mu\text{g/L}$ = microgram per liter

ALKPAH = alkylated polycyclic aromatic hydrocarbons

BTAG = Biological Technical Assistance Group

CAS RN = Chemical Abstracts Service Registry Number

DD_x = 2,4' and 4,4'-DDD, -DDE, -DDT

KM = Kaplan-Meier

MDL = method detection limit

METDISS = metals, dissolved

NYSDEC = New York State Department of Environmental Conservation

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

PCBCONG = PCB congeners

PESTH = pesticides – high resolution

SL = screening level

USEPA = U.S. Environmental Protection Agency

References:

Fuchsman et al. (Fuchsman, P.C., T.R. Barber, J.C. Lawton, and K.B. Leigh), 2006. An Evaluation of Cause–Effect Relationships Between Polychlorinated Biphenyl Concentrations and Sediment Toxicity to Benthic Invertebrates. *Environmental Toxicology and Chemistry* 25(10):2601–2612.

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Table 8-7
Sediment Bioassay Reference Envelope Evaluation Using Lower 95% Confidence Interval of 5th Percentile

| Location ID | Area | 28-day Percent Survival* | | 28-day Growth (biomass) | | 28-day Growth (weight) | | 28-day Reproduction per Surviving Amphipod | | 28-day Reproduction per Surviving Female Amphipod | | 10-day Percent Survival* | |
|-------------|---------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|--|-------------------------------------|---|-------------------------------------|-----------------------------|-------------------------------------|
| | | Control-Adjusted % Response | Significant Difference from Control | Control-Adjusted % Response | Significant Difference from Control | Control-Adjusted % Response | Significant Difference from Control | Control-Adjusted % Response | Significant Difference from Control | Control-Adjusted % Response | Significant Difference from Control | Control-Adjusted % Response | Significant Difference from Control |
| NC153SG | Newtown Creek | 76.56 | NSD | 78.59 | NSD | 104.42 | NSD | 38.51 | NSD | 37.96 | NSD | 70.33 | SD |
| NC154SG | Newtown Creek | 95.45 | NSD | 91.12 | NSD | 97.86 | NSD | 59.38 | NSD | 51.33 | NSD | 83.33 | NSD |
| NC156SG | Newtown Creek | 83.59 | NSD | 72.99 | NSD | 89.32 | NSD | 42.77 | NSD | 46.78 | NSD | 34.07 | SD |
| NC158SG | Newtown Creek | 78.13 | NSD | 73.25 | NSD | 94.73 | NSD | 21.06 | NSD | 30.50 | NSD | 49.45 | SD |
| NC013SG | Newtown Creek | 77.27 | NSD | 62.97 | NSD | 79.82 | NSD | 25.34 | SD | 31.51 | NSD | 25.56 | SD |
| NC161SG | Newtown Creek | 90.15 | NSD | 93.83 | NSD | 108.00 | NSD | 68.09 | NSD | 64.60 | NSD | 67.78 | SD |
| NC162SG | Newtown Creek | 75.00 | NSD | 45.21 | SD | 58.18 | NSD | 7.45 | NSD | 6.70 | SD | 42.86 | SD |
| DK001SG | Dutch Kills | 88.64 | NSD | 102.98 | NSD | 119.60 | NSD | 48.74 | NSD | 45.58 | NSD | 65.56 | SD |
| NC164SG | Newtown Creek | 96.21 | NSD | 96.13 | NSD | 101.76 | NSD | 46.03 | NSD | 34.73 | NSD | 62.22 | SD |
| NC037SG | Newtown Creek | 77.34 | NSD | 69.79 | NSD | 90.27 | NSD | 33.83 | NSD | 40.19 | NSD | 58.24 | SD |
| NC165SG | Newtown Creek | 96.97 | NSD | 118.74 | NSD | 122.99 | NSD | 67.12 | NSD | 60.23 | NSD | 36.67 | SD |
| NC046SG | Newtown Creek | 86.72 | NSD | 83.97 | NSD | 99.23 | NSD | 48.72 | NSD | 40.59 | NSD | 41.21 | SD |
| NC167SG | Newtown Creek | 60.16 | SD | 50.69 | SD | 88.95 | NSD | 12.98 | NSD | 18.65 | NSD | 16.48 | SD |
| NC168SG | Newtown Creek | 66.41 | SD | 63.54 | NSD | 98.42 | NSD | 15.53 | NSD | 19.62 | NSD | 29.67 | SD |
| NC169SG | Newtown Creek | 76.56 | NSD | 63.57 | NSD | 81.85 | NSD | 15.96 | NSD | 18.45 | NSD | 47.25 | SD |
| NC065SG | Newtown Creek | 42.97 | SD | 28.83 | SD | 61.62 | NSD | 2.98 | SD | 8.08 | SD | 29.67 | SD |
| NC174SG | Newtown Creek | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD |
| NC071SG | Newtown Creek | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD |
| MC017SG | Maspeth Creek | 15.91 | SD | 1.68 | SD | 15.40 | SD | 2.32 | SD | 0.00 | SD | 17.78 | SD |
| MC005SG | Maspeth Creek | 25.76 | SD | 5.12 | SD | 27.90 | SD | 4.06 | SD | 23.89 | SD | 6.67 | SD |
| MC023SG | Maspeth Creek | 7.03 | SD | 2.31 | SD | 30.25 | SD | 0.21 | SD | 0.00 | SD | 9.89 | SD |
| NC293SG | Newtown Creek | 0.78 | SD | -0.50 | SD | 3.24 | SD | 0.43 | SD | 0.00 | SD | 5.49 | SD |
| NC180SG | Newtown Creek | 5.47 | SD | 1.20 | SD | 10.38 | SD | 0.43 | SD | 1.21 | SD | 3.30 | SD |
| EB006SG | East Branch | 9.85 | SD | 2.71 | SD | 21.33 | SD | 0.39 | SD | 2.05 | SD | 5.56 | SD |
| EB036SG | East Branch | 8.59 | SD | -0.29 | SD | 14.51 | SD | 4.47 | SD | 0.81 | SD | 5.49 | SD |
| NC181SG | English Kills | 12.88 | SD | 1.31 | SD | 13.85 | SD | 1.16 | SD | 0.00 | SD | 6.67 | SD |
| EK057SG | English Kills | 9.09 | SD | -0.12 | SD | 6.00 | SD | 0.58 | SD | 1.37 | SD | 0.00 | SD |
| EK006SG | English Kills | 3.03 | SD | 0.96 | SD | 20.53 | SD | 0.00 | SD | 0.00 | SD | 1.11 | SD |
| EK059SG | English Kills | 1.52 | SD | 1.49 | SD | 14.49 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD |
| EK065SG | English Kills | 6.82 | SD | -0.04 | SD | 8.75 | SD | 0.00 | SD | 0.00 | SD | 5.56 | SD |
| EK072SG | English Kills | 8.33 | SD | 0.72 | SD | 16.14 | SD | 2.51 | SD | 15.02 | SD | 3.33 | SD |
| EK076SG | English Kills | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD | 0.00 | SD | 5.49 | SD |
| DK040SG | Dutch Kills | 13.28 | SD | 4.57 | SD | 18.89 | SD | 0.00 | SD | 0.00 | SD | 2.20 | SD |
| DK037SG | Dutch Kills | 12.88 | SD | 3.28 | SD | 31.01 | SD | 0.77 | SD | 1.82 | SD | 12.22 | SD |
| WC010SG | Whale Creek | 54.69 | SD | 52.37 | SD | 95.71 | NSD | 18.09 | NSD | 21.41 | NSD | 21.98 | SD |
| WC012SG | Whale Creek | 64.39 | SD | 30.86 | SD | 48.40 | SD | 6.19 | SD | 6.48 | SD | 11.11 | SD |

Notes:

Green shading indicates values greater than or equal to the reference envelope threshold.

Orange shading indicates values less than the reference envelope threshold.

* = For determining statistical difference from control, percent survival data were transformed using the arcsine of the square root of the value.

Reference envelope threshold determined based on the lower 95% confidence interval on the 5th percentile of best fit distribution.

Acronyms:

NSD = no significant difference

SD = significant difference

Table 8-9
Summary of Concentration-Response Prediction Error Rates
with or without Confounding Factor Stations

| Contingency Tables with All Data ¹ | | | | Contingency Table with Confounding Factor | | | |
|---|----------|----------|----------|---|----------|----------|----------|
| 28-Day Survival | | | | Stations Removed ² | | | |
| Sum Peeper Metals+SPME PAH TU>1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<1 | 2,2.41 | 31,37.35 | 33,39.76 | | 0,0.00 | 29,40.28 | 29,40.28 |
| TU>1 | 19,22.89 | 31,37.35 | 50,60.24 | | 12,16.67 | 31,43.06 | 43,59.72 |
| Total | 21,25.30 | 62,74.70 | 83 | | 12,16.67 | 60,83.33 | 72 |
| Sum Peeper Metals+SPME PAH TU>2 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2 | 8,9.64 | 57,68.67 | 65,78.31 | | 0,0.00 | 55,76.39 | 55,76.39 |
| TU>2 | 13,15.66 | 5,6.02 | 18,21.69 | | 12,16.67 | 5,6.94 | 17,23.61 |
| Total | 21,25.30 | 62,74.70 | 83 | | 12,16.67 | 60,83.33 | 72 |
| Sum Peeper Metals+SPME PAH TU>4.1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<4.1 | 9,10.84 | 61,73.49 | 70,84.34 | | 0,0.00 | 59,81.94 | 59,81.94 |
| TU>4.1 | 12,14.46 | 1,1.20 | 13,15.66 | | 12,16.67 | 1,1.39 | 13,18.06 |
| Total | 21,25.30 | 62,74.70 | 83 | | 12,16.67 | 60,83.33 | 72 |

| Contingency Tables with All Data ¹ | | | | Contingency Table with Confounding Factor | | | |
|---|----------|----------|----------|---|----------|----------|----------|
| 28-Day Biomass | | | | Stations Removed ² | | | |
| Sum Peeper Metals+SPME PAH TU>1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<1 | 3,3.61 | 30,36.14 | 33,39.76 | | 1,1.39 | 28,38.89 | 29,40.28 |
| TU>1 | 23,27.71 | 27,32.53 | 50,60.24 | | 16,22.22 | 27,37.50 | 43,59.72 |
| Total | 26,31.33 | 57,68.67 | 83 | | 17,23.61 | 55,76.39 | 72 |
| Sum Peeper Metals+SPME PAH TU>2 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2 | 10,12.05 | 55,66.27 | 65,78.31 | | 2,2.78 | 53,73.61 | 55,76.39 |
| TU>2 | 16,19.28 | 2,2.41 | 18,21.69 | | 15,20.83 | 2,2.78 | 17,23.61 |
| Total | 26,31.33 | 57,68.67 | 83 | | 17,23.61 | 55,76.39 | 72 |
| Sum Peeper Metals+SPME PAH TU>3.4 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<3.4 | 10,12.05 | 59,71.08 | 69,83.13 | | 1,1.39 | 57,79.17 | 58,80.56 |
| TU>3.4 | 13,15.66 | 1,1.20 | 14,16.87 | | 13,18.06 | 1,1.39 | 14,19.44 |
| Total | 23,27.71 | 60,72.29 | 83 | | 14,19.44 | 58,80.56 | 72 |

Table 8-9
Summary of Concentration-Response Prediction Error Rates
with or without Confounding Factor Stations

| Contingency Tables with All Data ¹ | | | | Contingency Table with Confounding Factor Stations Removed ² | | | |
|---|----------|----------|----------|---|----------|----------|----------|
| 28-Day Weight | | | | 28-Day Weight | | | |
| Sum Peeper Metals+SPME PAH TU>1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<1 | 3,3.61 | 30,36.14 | 33,39.76 | | 1,1.39 | 28,38.89 | 29,40.28 |
| TU>1 | 23,27.71 | 27,32.53 | 50,60.24 | | 16,22.22 | 27,37.50 | 43,59.72 |
| Total | 26,31.33 | 57,68.67 | 83 | | Total | 17,23.61 | 55,76.39 |
| Sum Peeper Metals+SPME PAH TU>2 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2 | 10,12.05 | 55,66.27 | 65,78.31 | | 2,2.78 | 53,73.61 | 55,76.39 |
| TU>2 | 16,19.28 | 2,2.41 | 18,21.69 | | 15,20.83 | 2,2.78 | 17,23.61 |
| Total | 26,31.33 | 57,68.67 | 83 | | Total | 17,23.61 | 55,76.39 |
| Sum Peeper Metals+SPME PAH TU>4.8 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<4.8 | 10,12.05 | 55,66.27 | 65,78.31 | | 1,1.39 | 58,80.56 | 59,81.94 |
| TU>4.8 | 16,19.28 | 2,2.41 | 18,21.69 | | 12,16.67 | 1,1.39 | 13,18.06 |
| Total | 26,31.33 | 57,68.67 | 83 | | Total | 13,18.06 | 59,81.94 |

| Contingency Tables with All Data ¹ | | | | Contingency Table with Confounding Factor Stations Removed ² | | | |
|---|----------|----------|----------|---|----------|----------|----------|
| 28-Day Reproduction per Amphipod ³ | | | | 28-Day Reproduction per Amphipod ³ | | | |
| Sum Peeper Metals+SPME PAH TU>1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<1 | 2,2.41 | 31,37.35 | 33,39.76 | | 0,0.00 | 29,40.28 | 29,40.28 |
| TU>1 | 19,22.89 | 31,37.35 | 50,60.24 | | 13,18.06 | 30,41.67 | 43,59.72 |
| Total | 21,25.30 | 62,74.70 | 83 | | Total | 13,18.06 | 59,81.94 |
| Sum Peeper Metals+SPME PAH TU>2 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2 | 7,8.43 | 58,69.88 | 65,78.31 | | 0,0.00 | 55,76.39 | 55,76.39 |
| TU>2 | 14,16.87 | 4,4.82 | 18,21.69 | | 13,18.06 | 4,4.56 | 17,23.61 |
| Total | 21,25.30 | 62,74.70 | 83 | | Total | 13,18.06 | 59,81.94 |

Table 8-9
Summary of Concentration-Response Prediction Error Rates
with or without Confounding Factor Stations

| Contingency Tables with All Data ¹ | | | | Contingency Table with Confounding Factor Stations Removed ² | | | |
|--|----------|----------|----------|---|----------|----------|----------|
| <i>28-Day Reproduction per Female Amphipod</i> | | | | <i>28-Day Reproduction per Female Amphipod</i> ³ | | | |
| Sum Peeper Metals+SPME PAH TU>1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<1 | 2,2.41 | 31,37.35 | 33,39.76 | TU<1 | 0,0.00 | 29,40.28 | 29,40.28 |
| TU>1 | 20,24.10 | 30,36.14 | 50,60.24 | TU>1 | 14,19.44 | 29,40.28 | 43,59.72 |
| Total | 22,26.51 | 61,73.49 | 83 | Total | 14,19.44 | 58,80.56 | 72 |
| Sum Peeper Metals+SPME PAH TU>2 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2 | 7,8.43 | 58,69.88 | 65,78.31 | TU<2 | 0,0.00 | 55,76.39 | 55,76.39 |
| TU>2 | 15,18.07 | 3,3.61 | 18,21.69 | TU>2 | 14,19.44 | 3,4.17 | 17,23.61 |
| Total | 22,26.51 | 61,73.49 | 83 | Total | 14,19.44 | 58,80.56 | 72 |

| Contingency Tables with All Data ¹ | | | | Contingency Table with Confounding Factor Stations Removed ² | | | |
|---|----------|----------|----------|---|----------|----------|----------|
| <i>10-Day Survival</i> | | | | <i>10-Day Survival</i> | | | |
| Sum Peeper Metals+SPME PAH TU>1 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<1 | 5,6.02 | 28,33.73 | 33,39.76 | TU<1 | 3,4.17 | 26,36.11 | 29,40.28 |
| TU>1 | 27,32.53 | 23,27.71 | 50,60.24 | TU>1 | 20,27.78 | 23,31.94 | 43,59.72 |
| Total | 32,38.55 | 51,61.45 | 83 | Total | 23,31.94 | 49,68.06 | 72 |
| Sum Peeper Metals+SPME PAH TU>2 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2 | 16,19.28 | 49,59.04 | 65,78.31 | TU<2 | 8,11.11 | 47,65.28 | 55,76.39 |
| TU>2 | 16,19.28 | 2,2.41 | 18,21.69 | TU>2 | 15,20.83 | 2,2.78 | 17,23.61 |
| Total | 32,38.55 | 51,61.45 | 83 | Total | 23,31.94 | 49,68.06 | 72 |
| Sum Peeper Metals+SPME PAH TU>2.7 | | | | | | | |
| Count,Total % | Hit | No Hit | Total | Count,Total % | Hit | No Hit | Total |
| TU<2.7 | 18,21.69 | 51,61.45 | 69,83.13 | TU<2.7 | 9,12.50 | 49,68.06 | 58,80.56 |
| TU>2.7 | 14,16.87 | 0,0.00 | 14,16.87 | TU>2.7 | 14,19.44 | 0,0.00 | 14,19.44 |
| Total | 32,38.55 | 51,61.45 | 83 | Total | 23,31.94 | 49,68.06 | 72 |

Table 8-9
Summary of Concentration-Response Prediction Error Rates
with or without Confounding Factor Stations

Notes:

1 = All data include 48 reference area and 35 Study Area bioassay test samples. SPME PAH sample data were not available for Station NC013SG; these data were not included in the contingency evaluation.

2 = Stations removed as confounding factors due to C19-C36 aliphatic concentrations include: NC065, DK037, DK040, EB006, EB036, MC005, MC017, WE012, and WE014. Reference area samples include both bioassay batch results for a total of 11 stations removed.

3 = A logistic regression curve could not be fitted to the reproduction by amphipod endpoint.



Gray shading indicates a false negative result.

Green shading indicates a correct result.

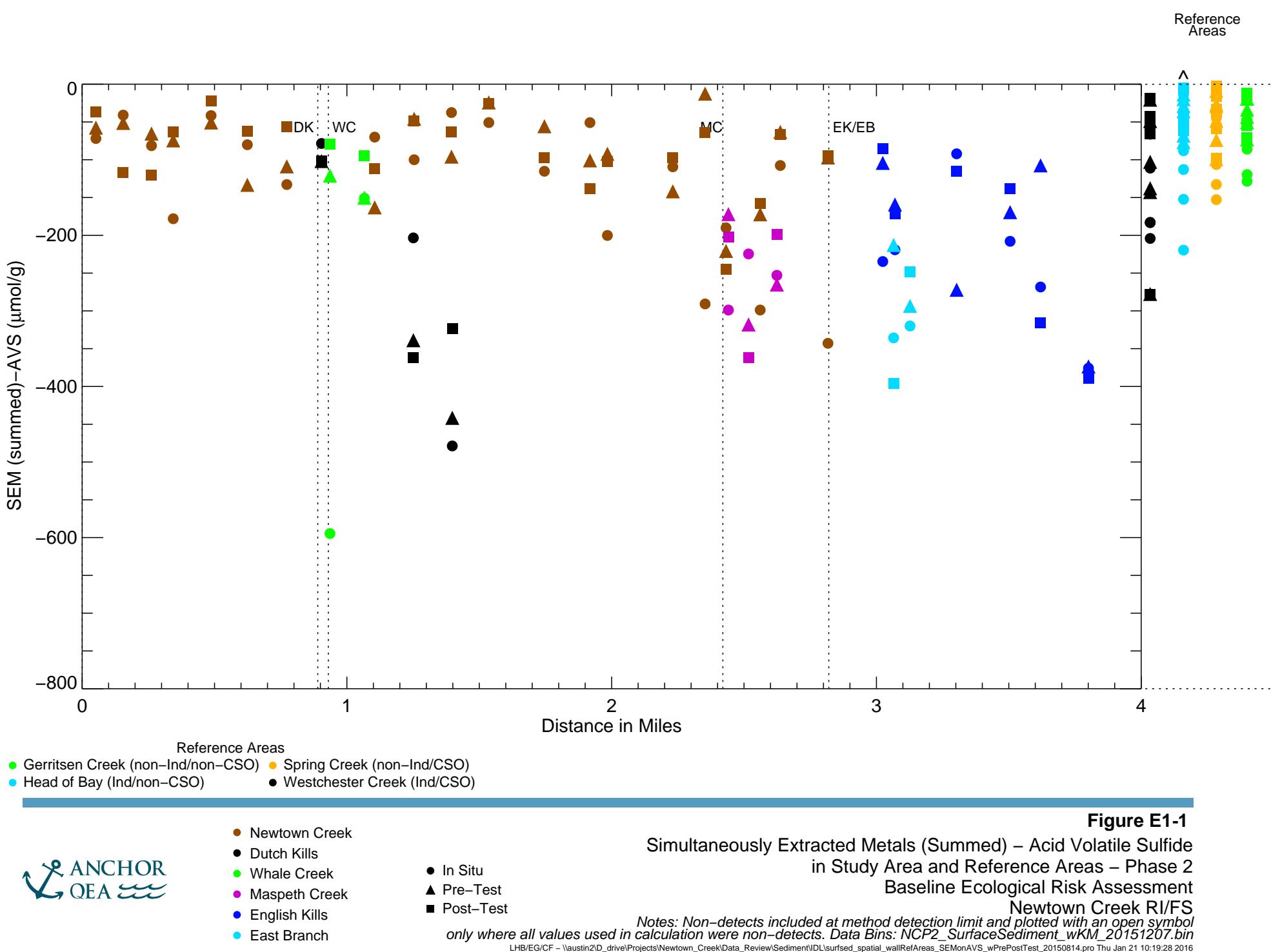
Blue shading indicates a false positive result.

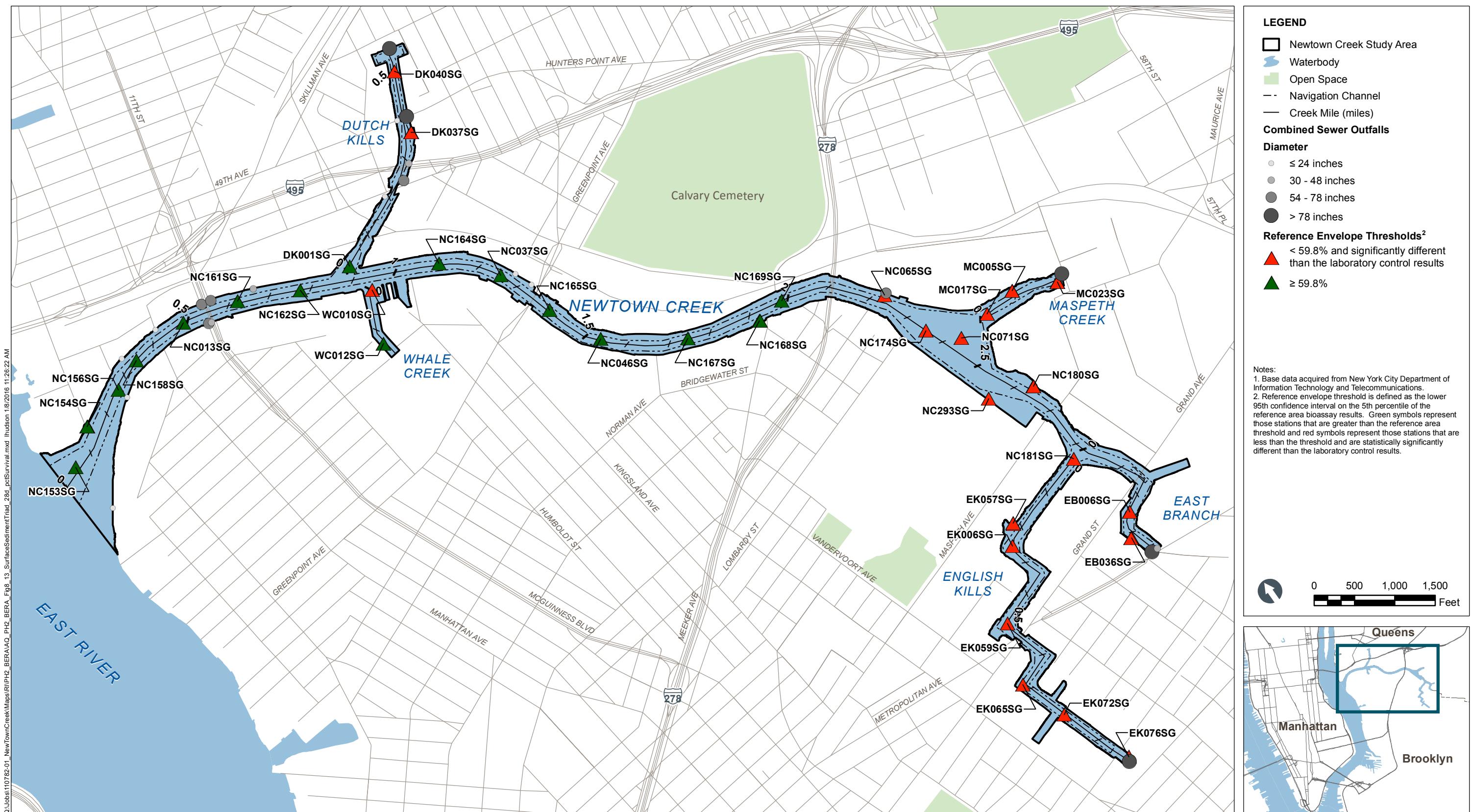
Acronyms:

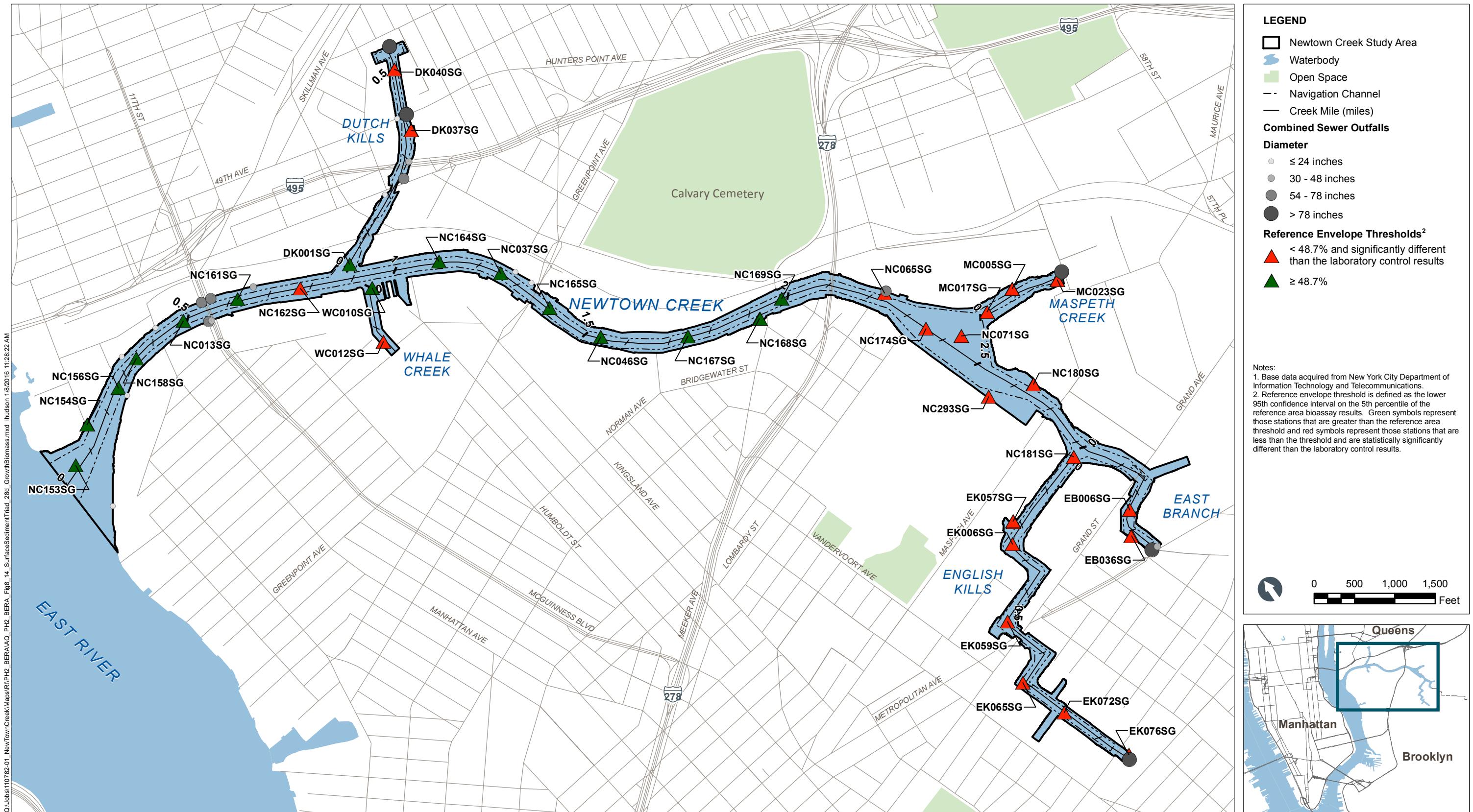
PAH = polycyclic aromatic hydrocarbon

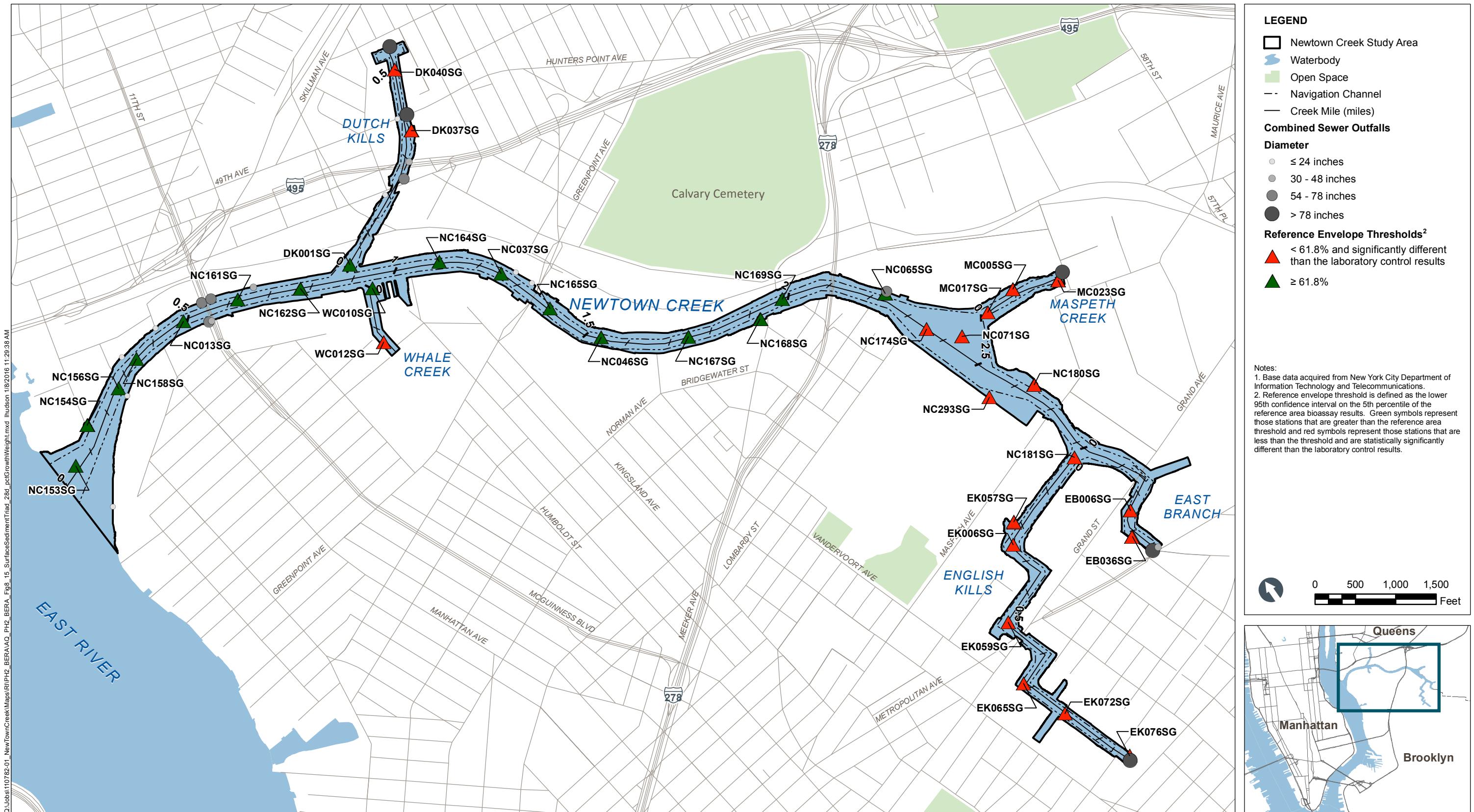
SPME = solid-phase microextraction

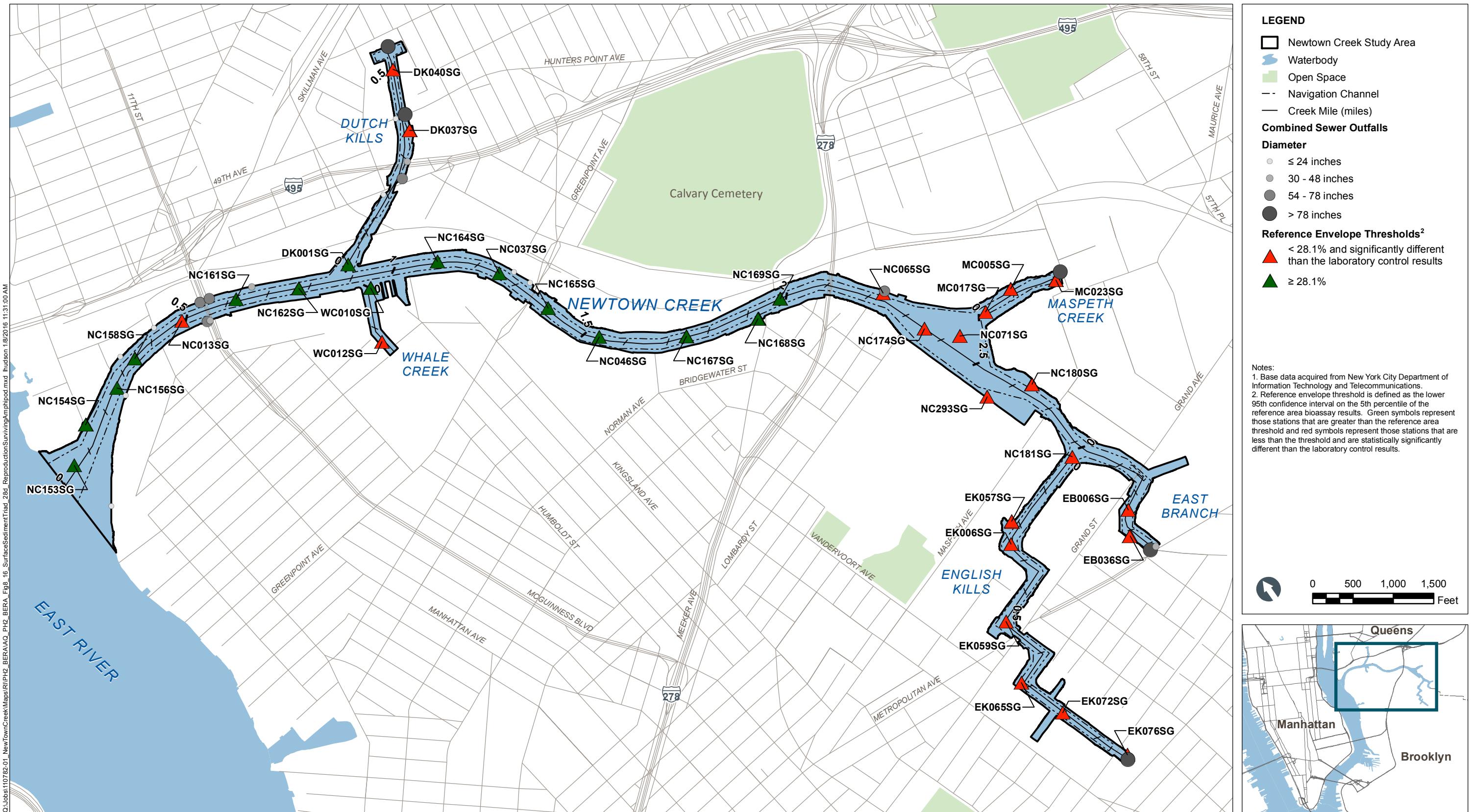
TU = toxic unit











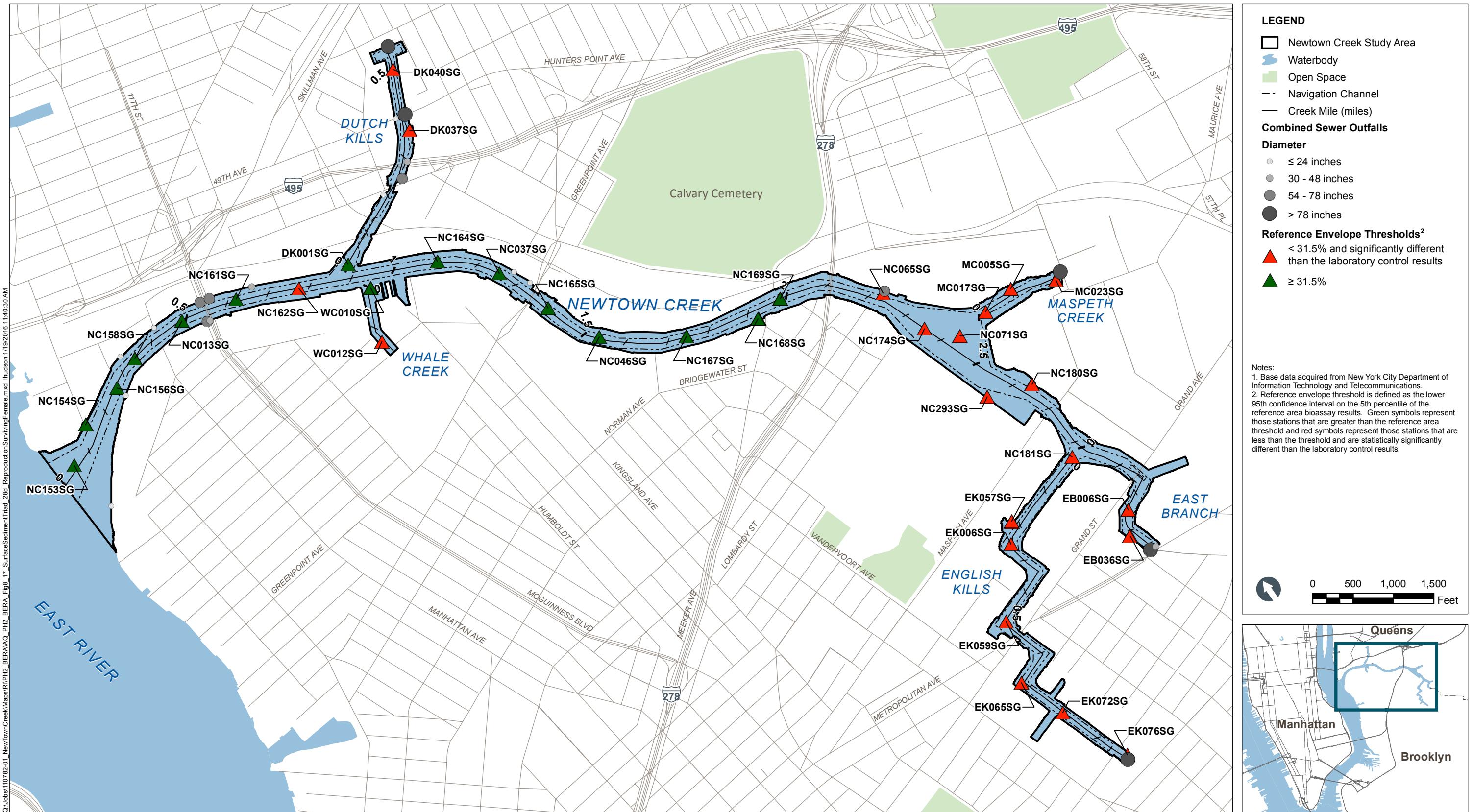
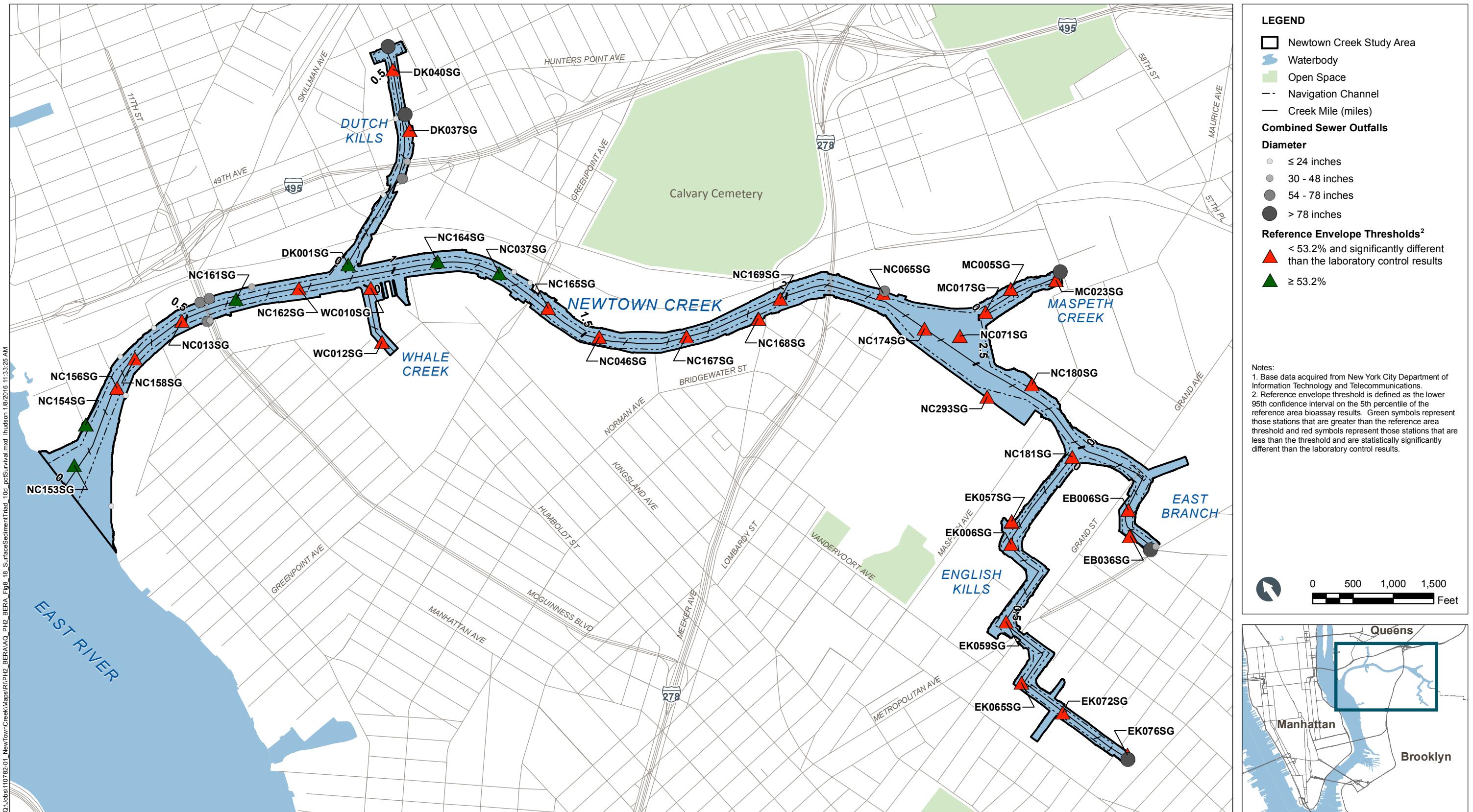


Figure 8-17
28-day Reproduction (Per Surviving Female) Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



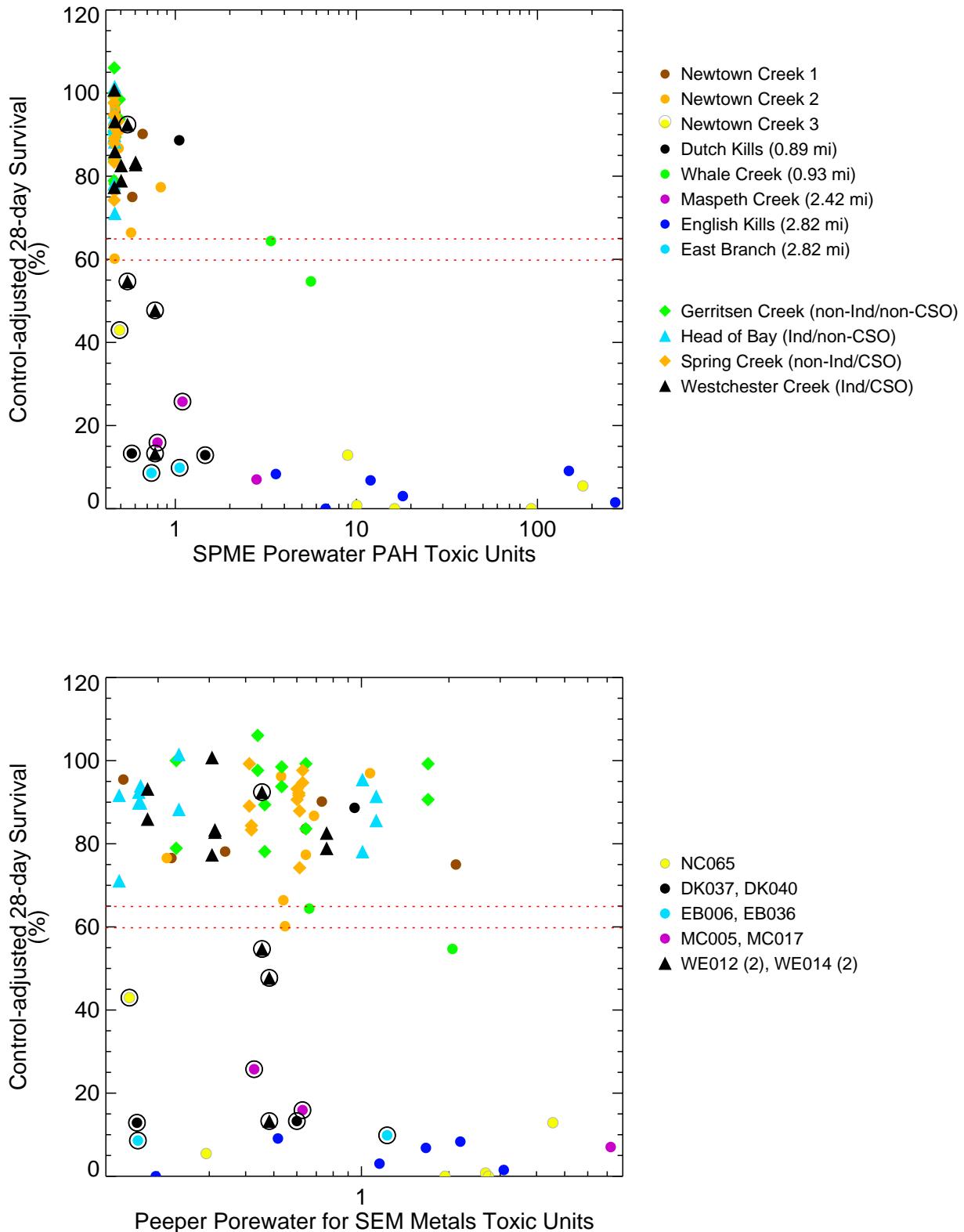
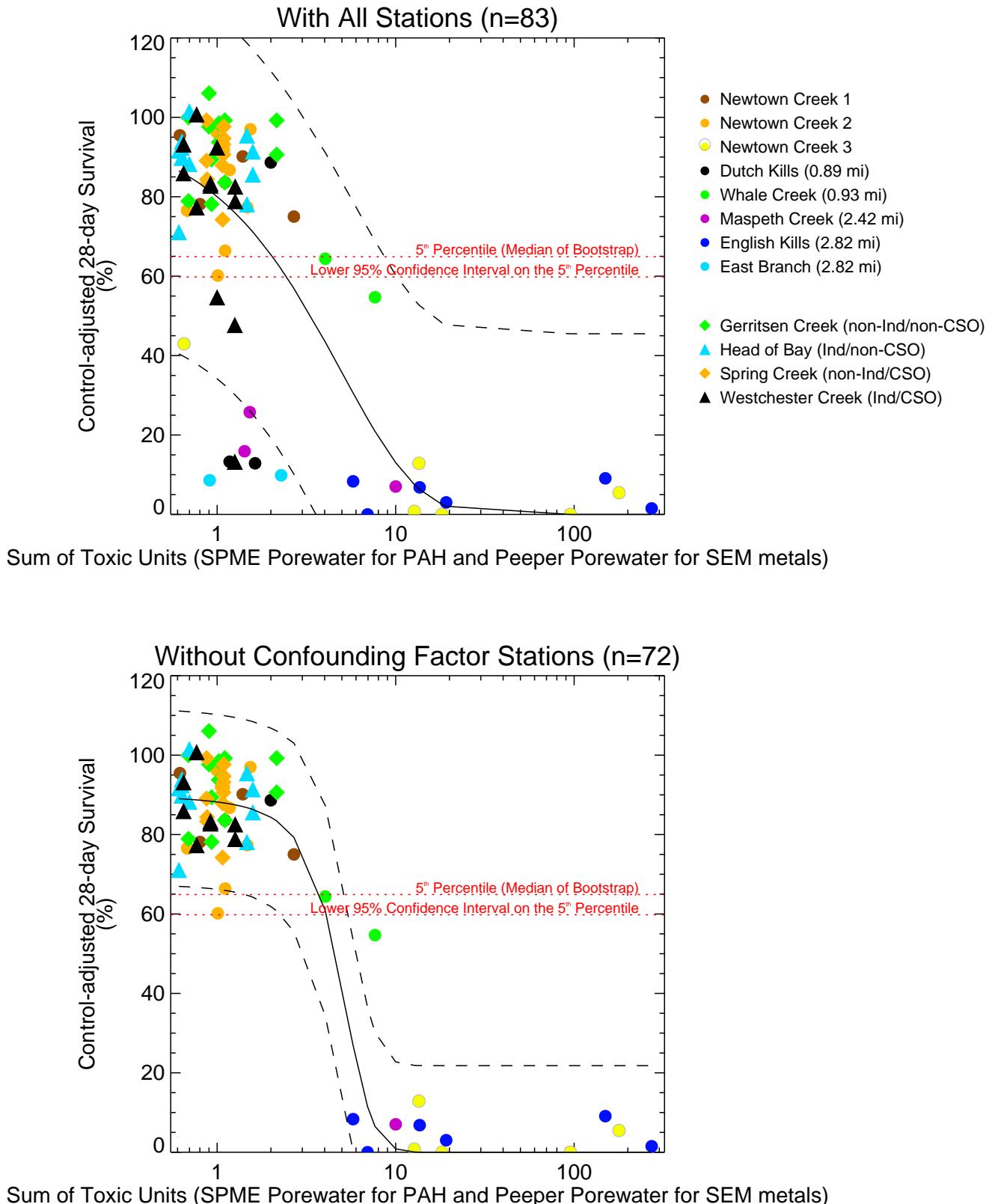


Figure 8-19a
Leptocheirus Concentration-Response - Control-adjusted 28-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_Survival Bioassay_PW_PAH_SEM-Metal_noNC013.csv

**Figure 8-19b**

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



*Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_Survival_Bioassay_PW_PAH_SEM-Metal_noNC013.csv*

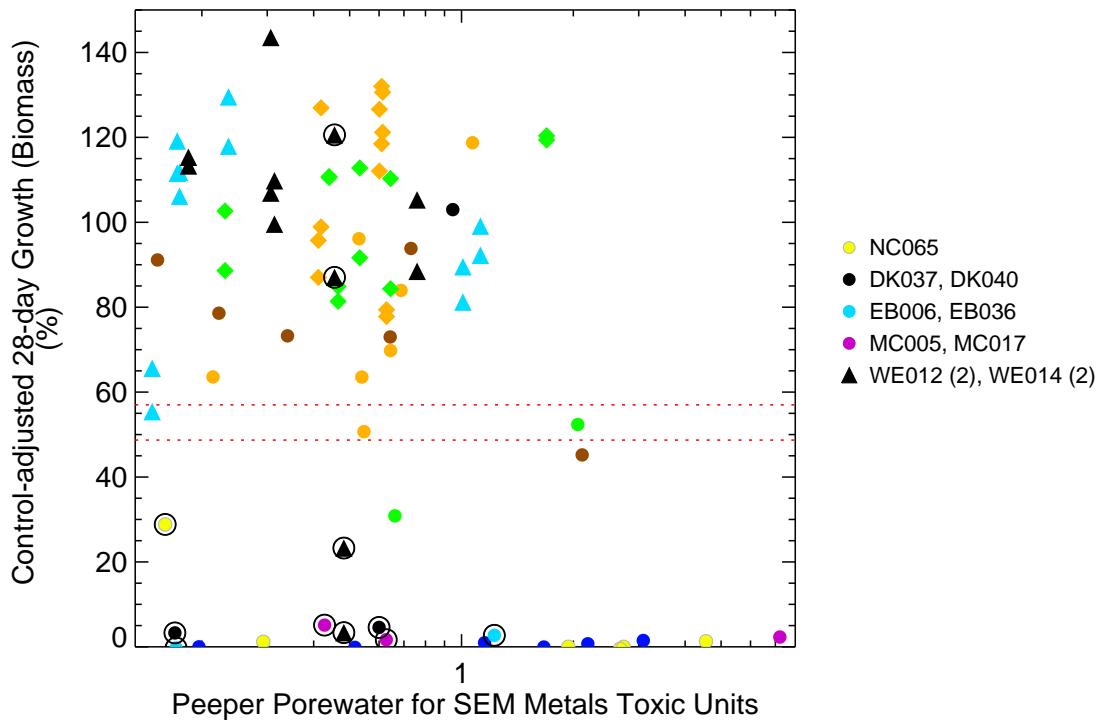
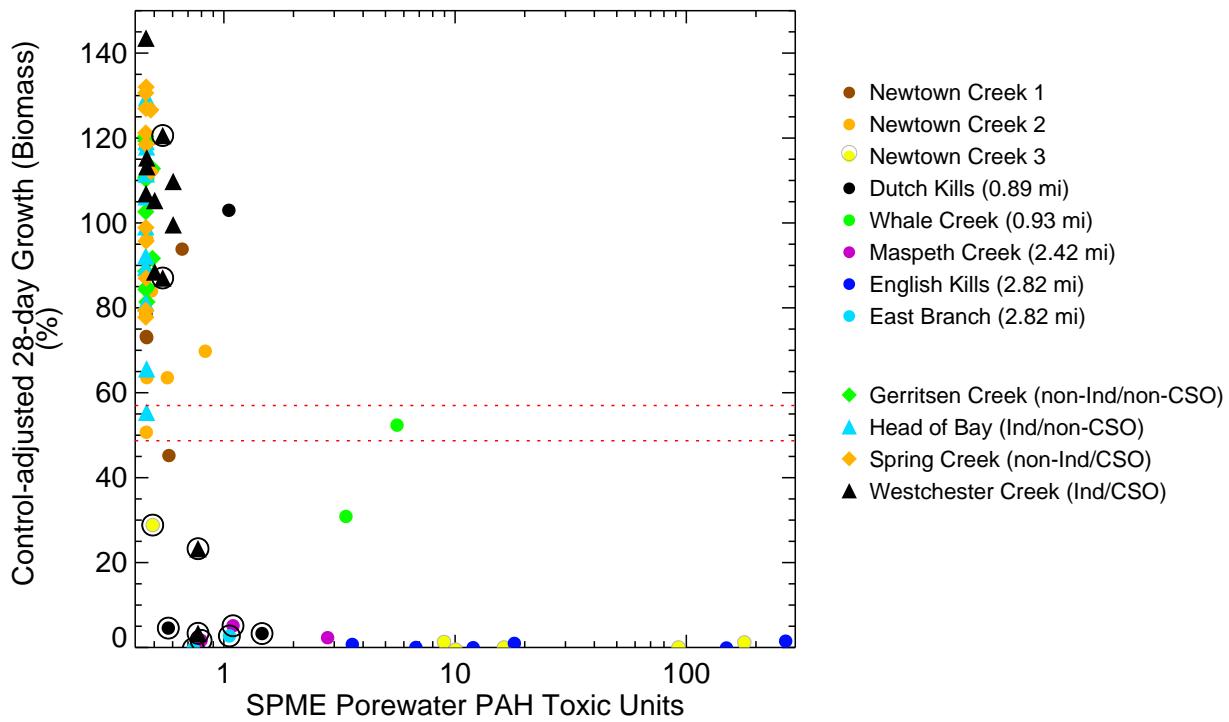
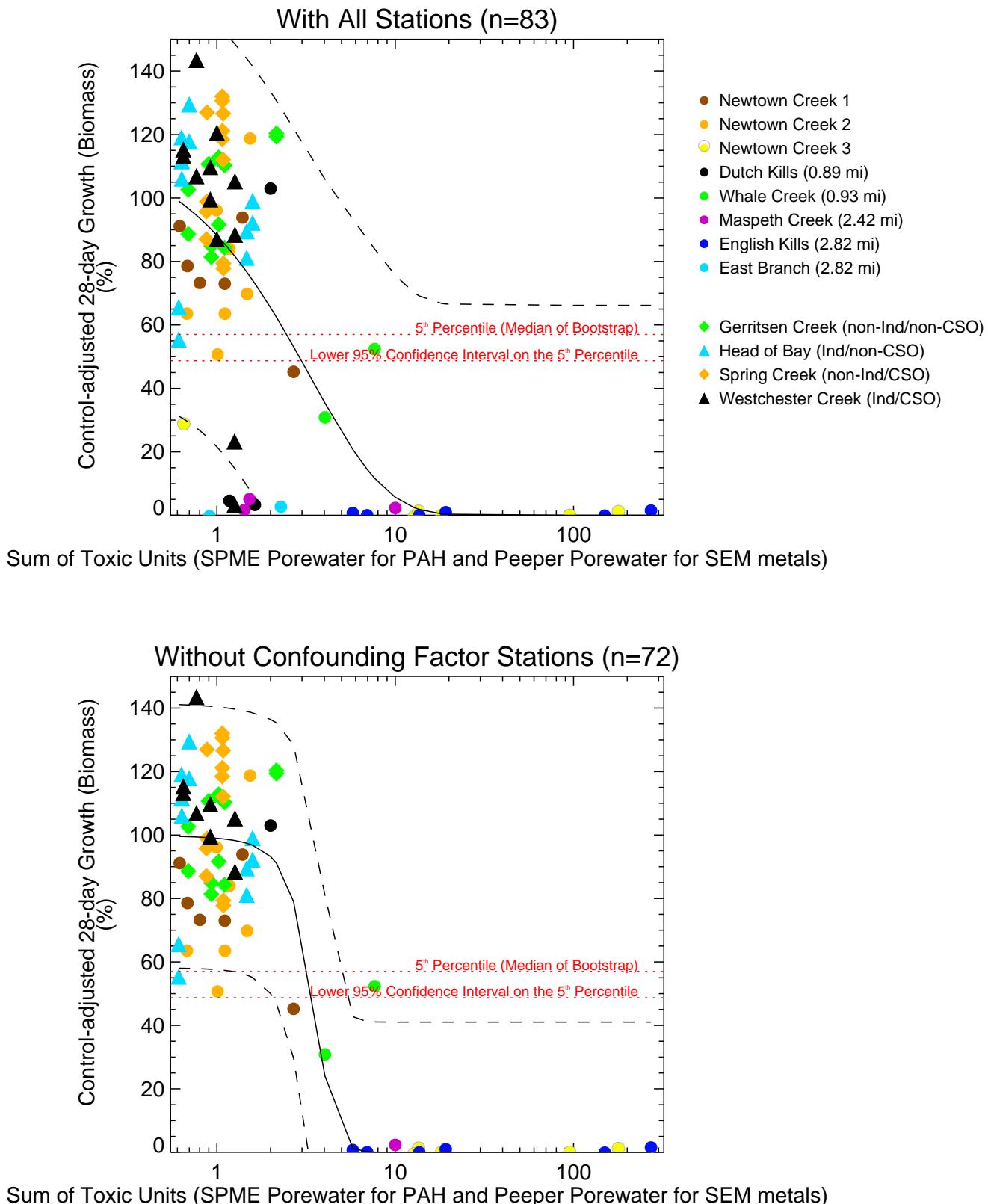


Figure 8-20a

Leptocheirus Concentration-Response - Control-adjusted 28-day Growth (Biomass)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_Biomass_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

**Figure 8-20b**

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Growth (Biomass)
 Baseline Ecological Risk Assessment
 Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation.
 Solid line shows fitted logistic regression output.
 Dashed lines show upper and lower confidence intervals where possible to calculate.
 Data file: 28-d_Biomass_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

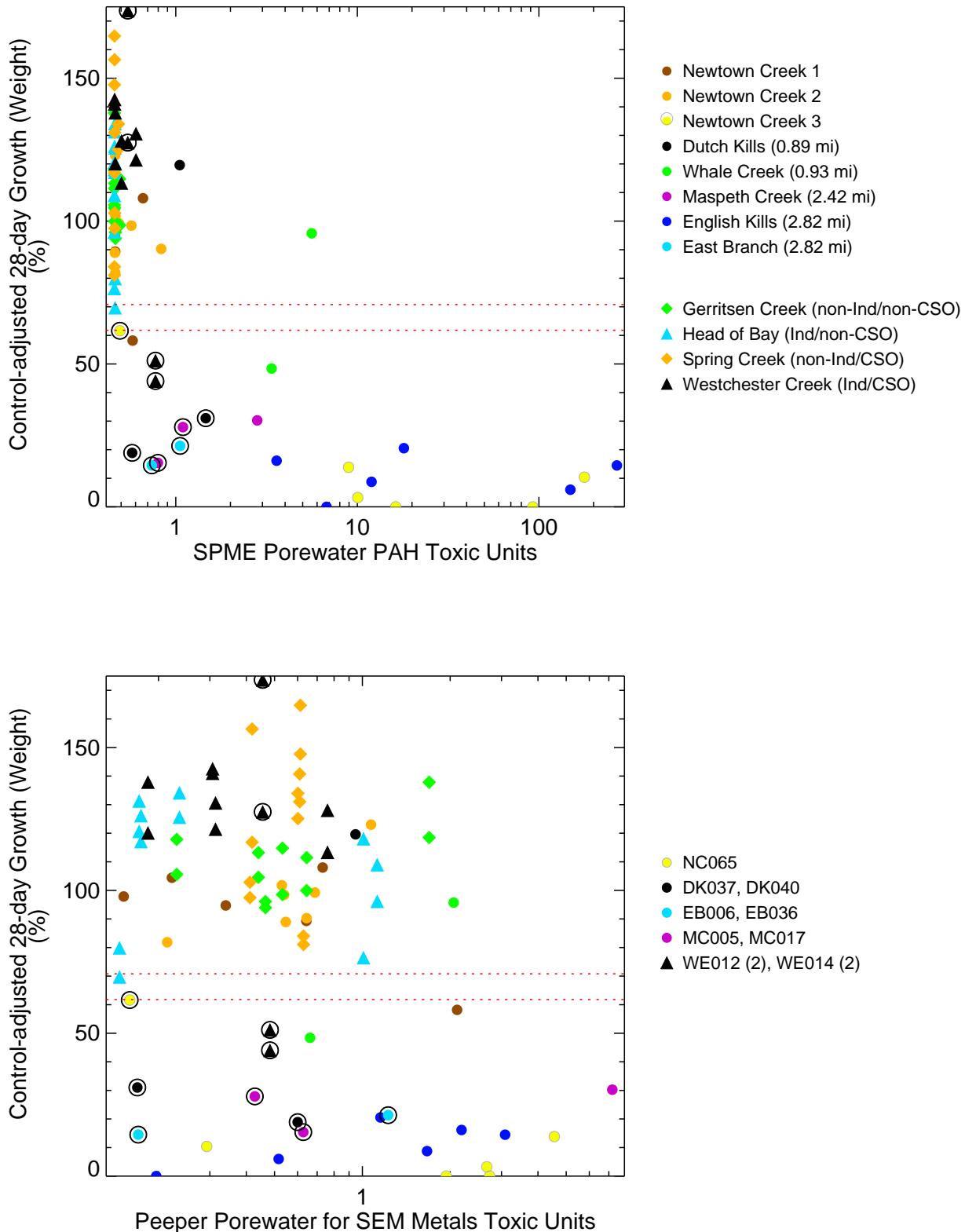
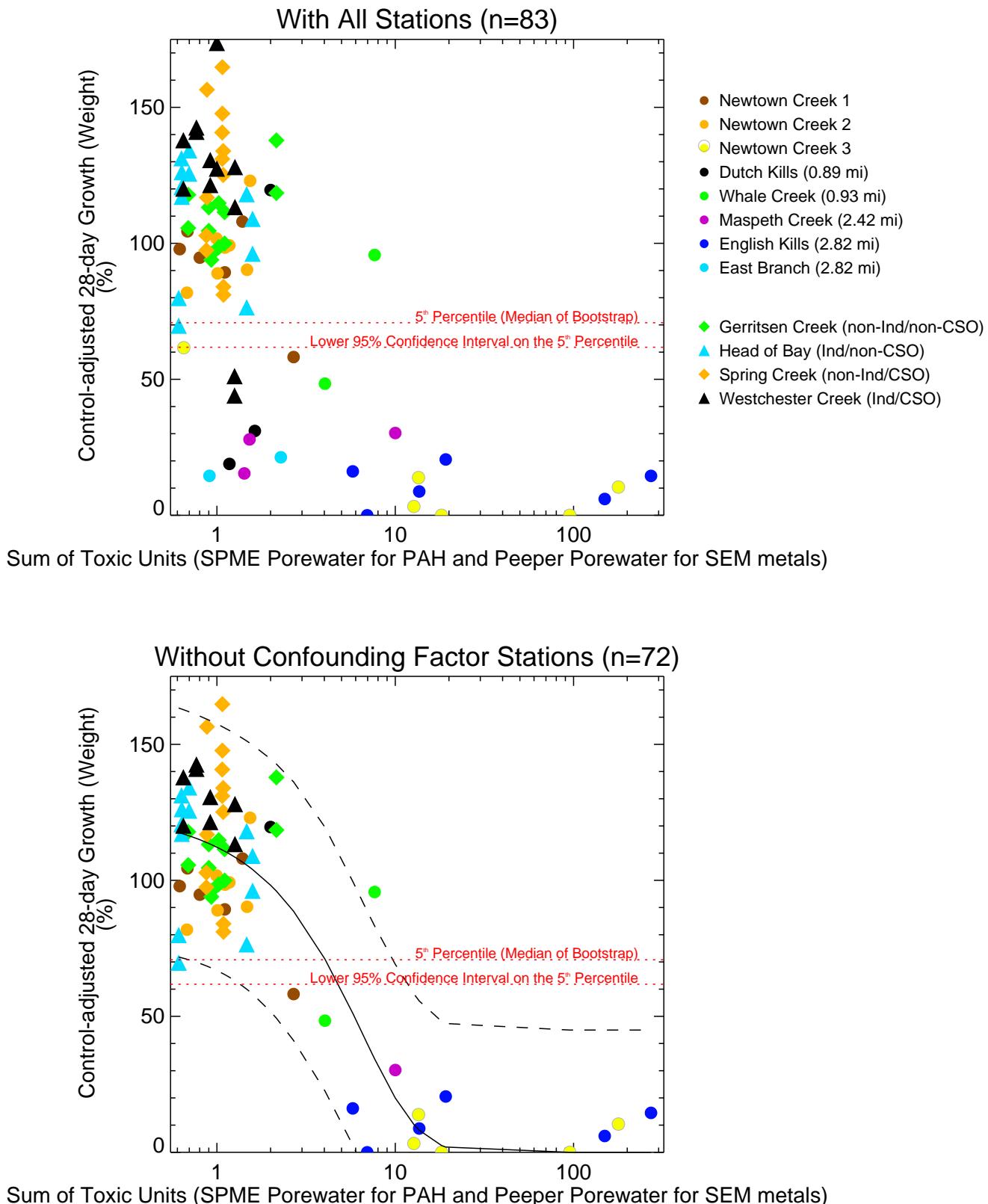


Figure 8-21a
Leptocheirus Concentration-Response - Control-adjusted 28-day Growth (Weight)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_Weight_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

**Figure 8-21b**

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Growth (Weight)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_Weight_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

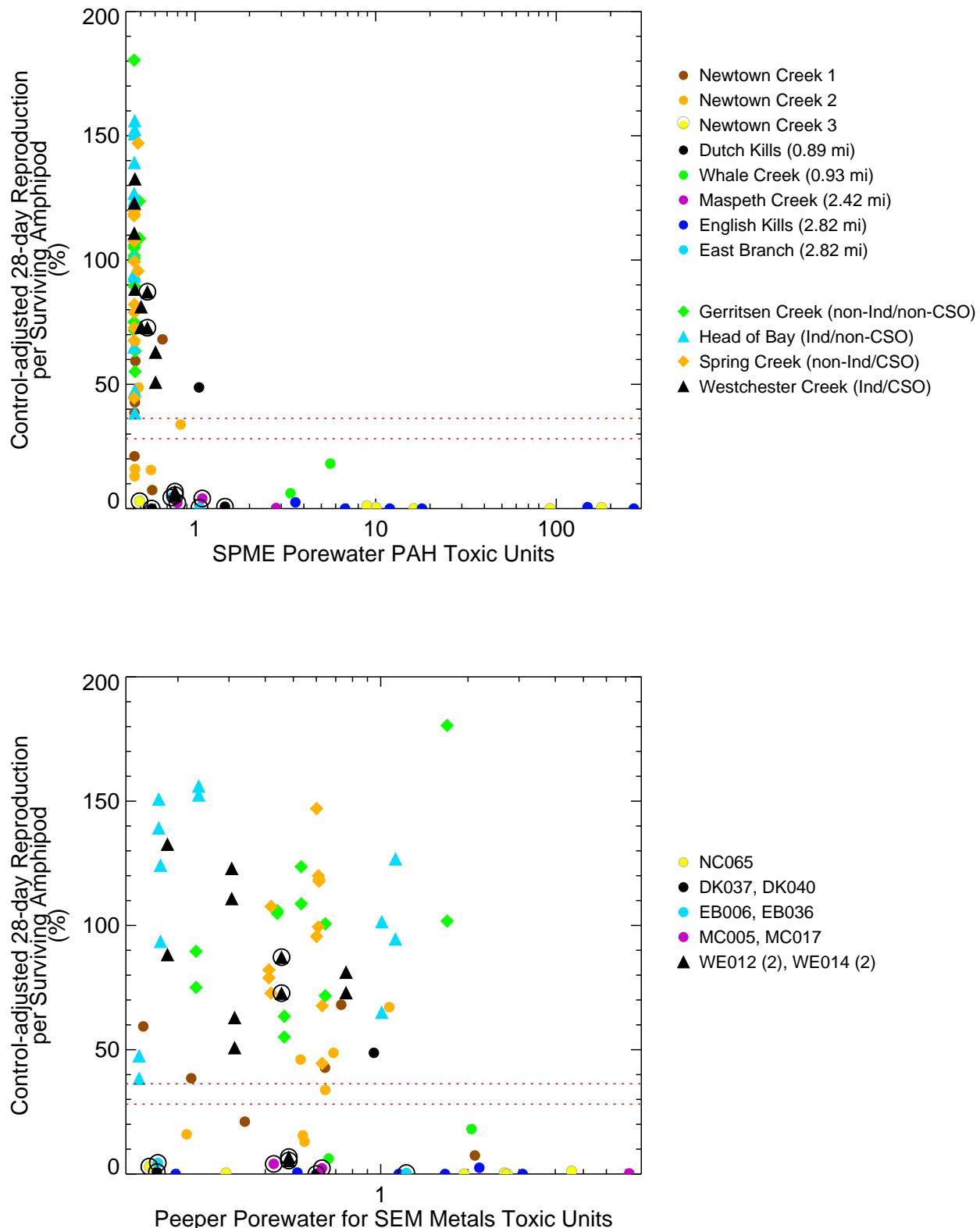
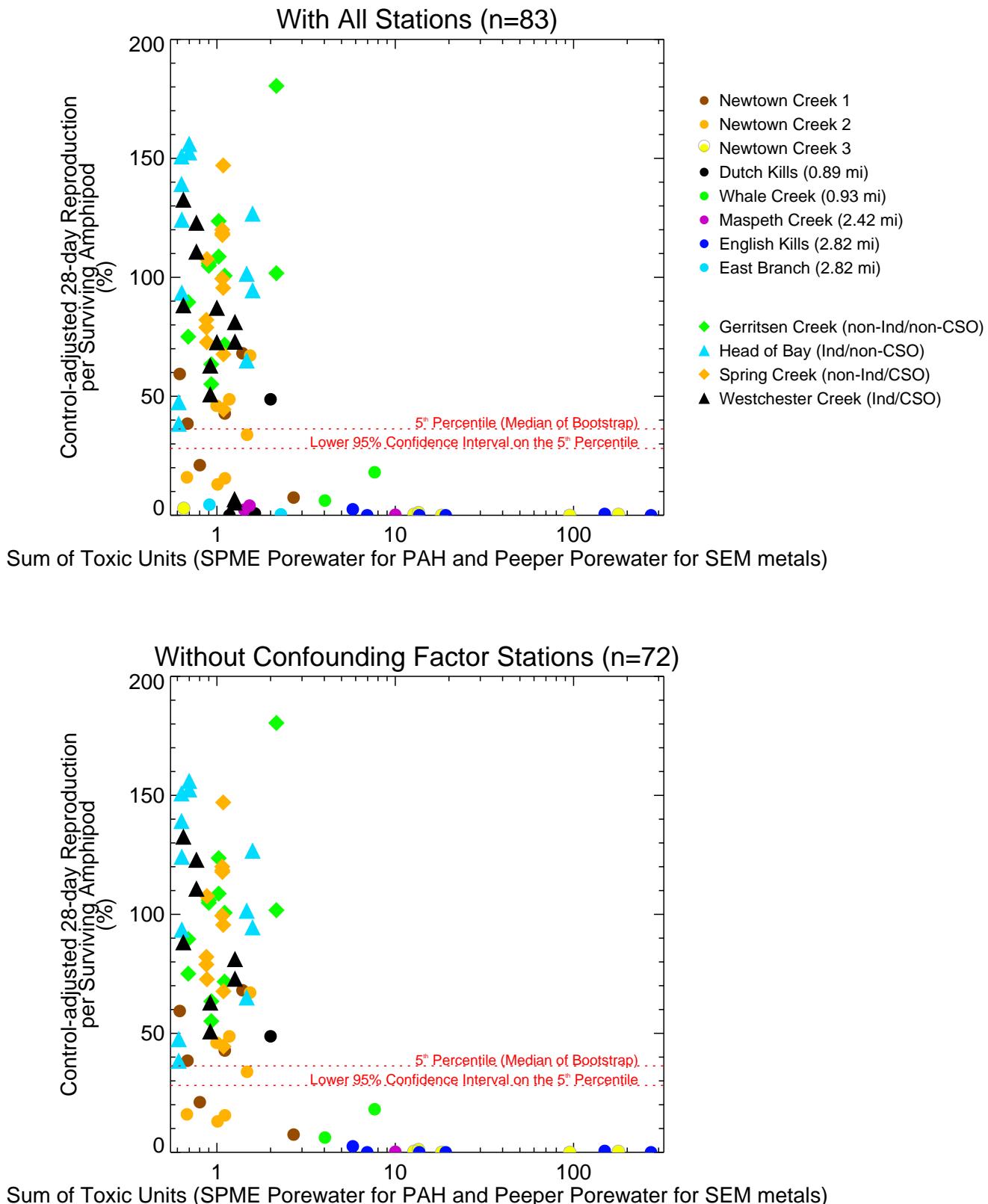


Figure 8-22a
Leptocheirus Concentration-Response - Control-adjusted 28-day Reproduction per Surviving Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_ReprotoAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

**Figure 8-22b**

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Reproduction per Surviving Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation. Solid line shows fitted logistic regression output.

Dashed lines show upper and lower confidence intervals where possible to calculate.

Data file: 28-d_ReproAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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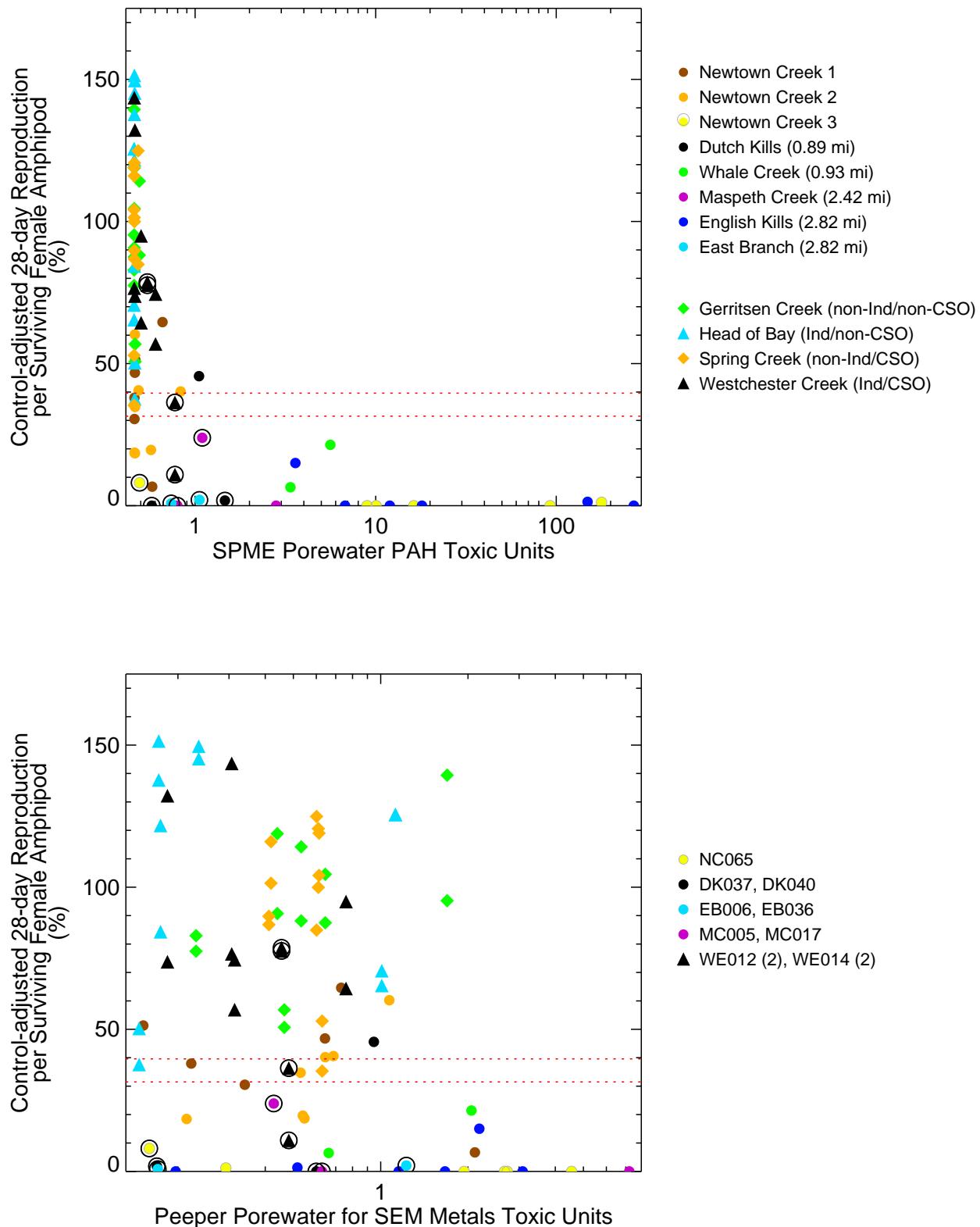
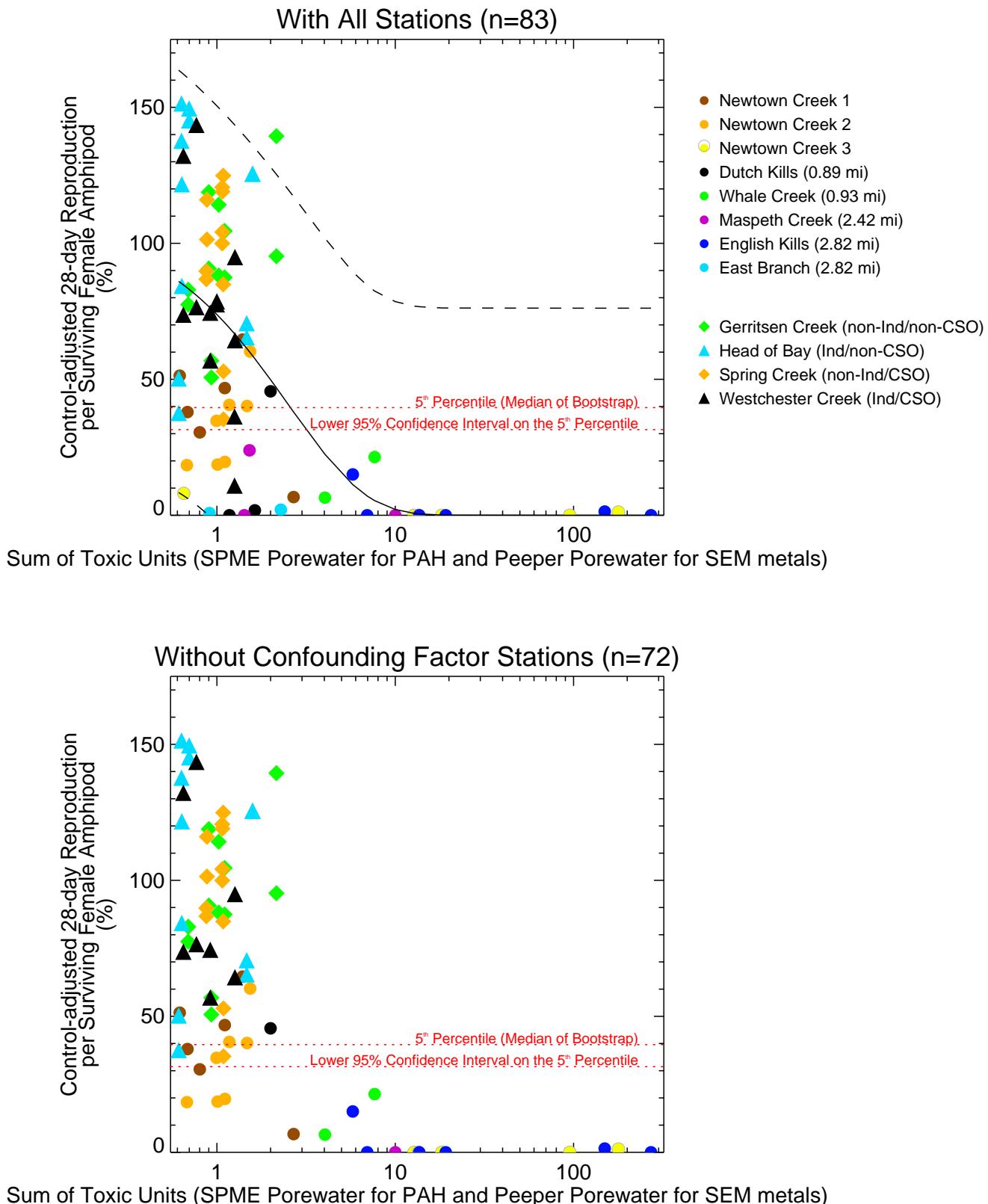


Figure 8-23a
Leptocheirus Concentration-Response - Control-adjusted 28-day Reproduction per Surviving Female Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_ReprotoFemaleAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

**Figure 8-23b**

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Reproduction per Surviving Female Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation. Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_ReprotoFemaleAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv
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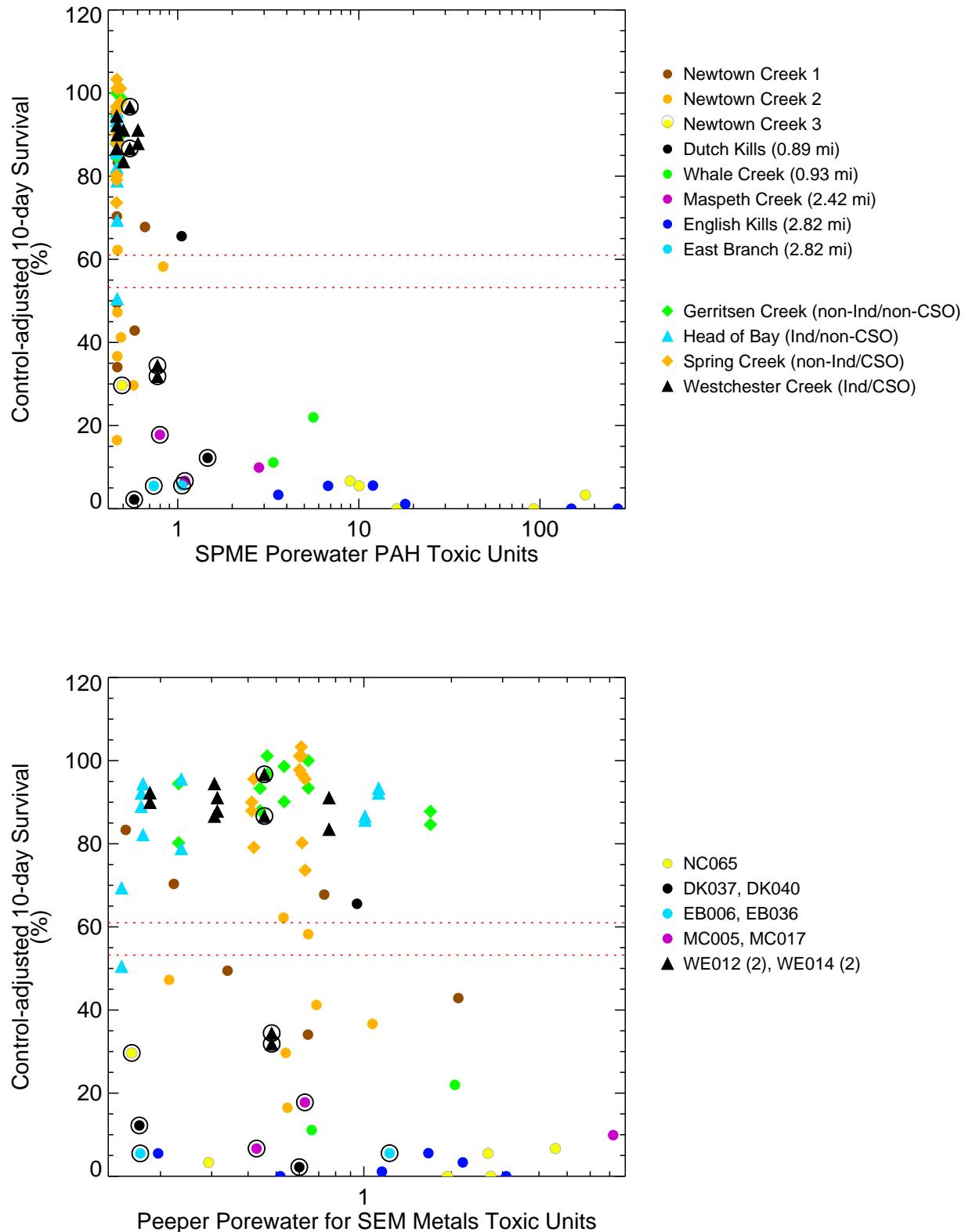
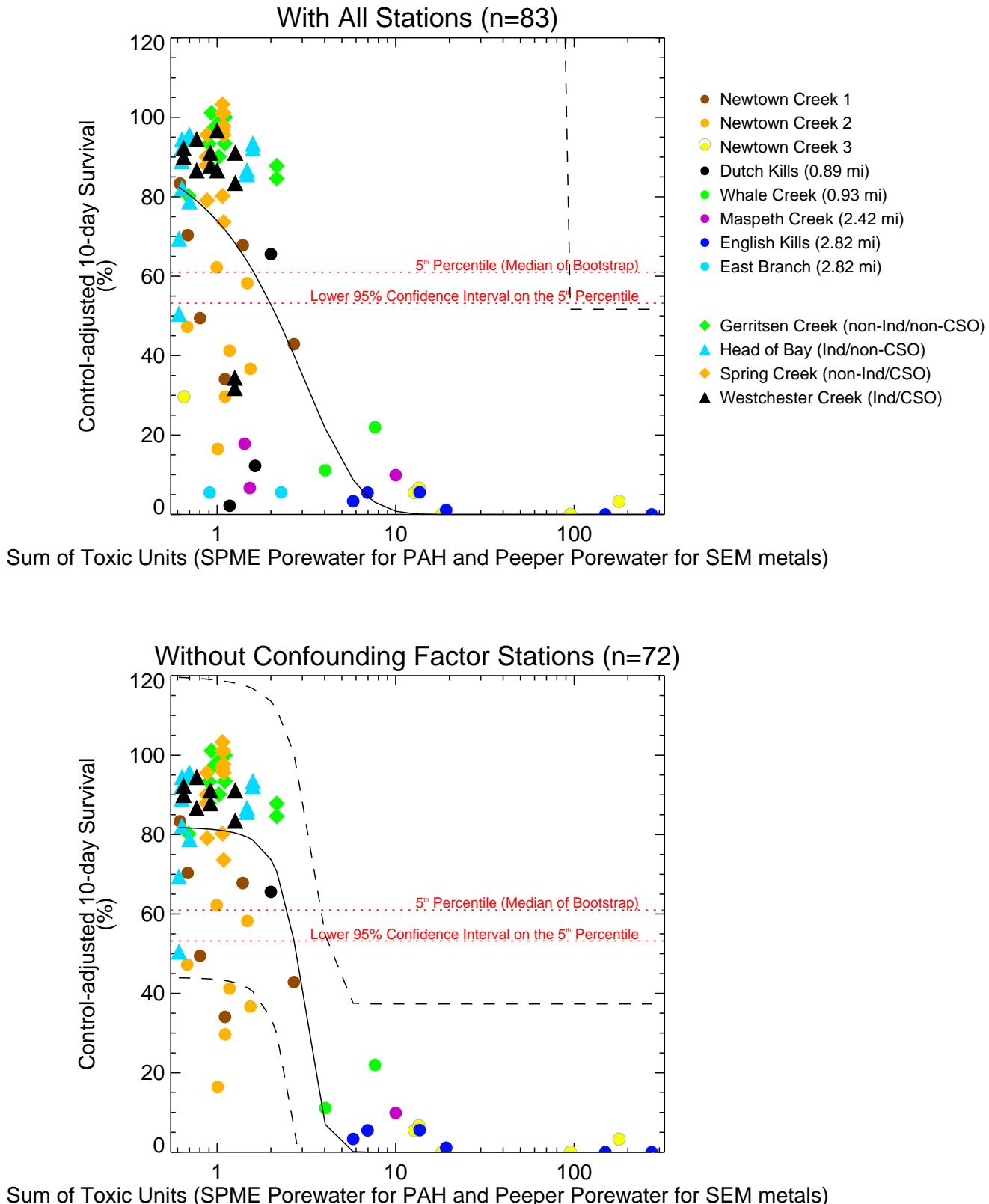


Figure 8-24a
Leptocheirus Concentration-Response - Control-adjusted 10-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 10-d_Survival Bioassay_PW_PAH_SEM-Metal_noNC013.csv

**Figure 8-24b**

Leptocheirus Concentration-Response Curves - Control-adjusted 10-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 10-d_Survival_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

BERA Response to Comment Items Discussed with USEPA on 1/4/2017

Two items were discussed with USEPA during a dispute resolution call on 1/4/2017:

- Polychaete/sediment regressions
- Surface water screening levels

Polychaete/Sediment Regressions (Response to Comment Matrix ID Nos. 186 and 269)

USEPA commented that it is unacceptable to use predicted tissue concentrations if measured tissue concentrations are available. Anchor QEA clarified that for the wildlife risk assessment, measured polychaete tissue concentrations were used to estimate dietary uptake. Specifically, for the BERA, paired polychaete tissue and bulk sediment concentrations were measured at 13 stations in the Study Area (see BERA Figure 4-4 for the location of the 13 stations). The measured tissue concentrations at these 13 locations were used to estimate dietary uptake at these locations. The paired polychaete-sediment data at these 13 locations also were used to develop a site-specific regression that was then used to predict tissue concentrations at other sediment locations where wildlife dietary uptake was estimated for the BERA but for which polychaete tissue data were unavailable (see BERA report Section 11.4.3.3 and Figures 11-5a to 11-5c).

Surface Water Screening Levels (Response to Comment Matrix ID No. 216)

In accepting the NCG's response to USEPA's original comment, USEPA added the caveat that two additional NYSDEC screening levels (SLs) should be included in the surface water SLERA: one for total DDx and one for the sum of aldrin and dieldrin. Anchor QEA explained that this requirement is confusing because of the timing of the request at this late stage of the BERA, given that the surface water SLs are based on a hierarchy provided to the NCG by USEPA at the beginning of the ecological risk assessment process. In addition, and more importantly, the DDx SL is based on exposure to wildlife, which is being addressed through separate SLERA and baseline analyses, and the aldrin-dieldrin SL is a human health SL based on fish consumption, and therefore, not relevant to an ecological risk assessment.

NYSDEC (Ian Beilby) agreed that since this comment came from them, they would provide a response to the NCG on this item. To date, no response has been received from NYSDEC.